Pit and Quarry

Published Every Other Wednesday for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.

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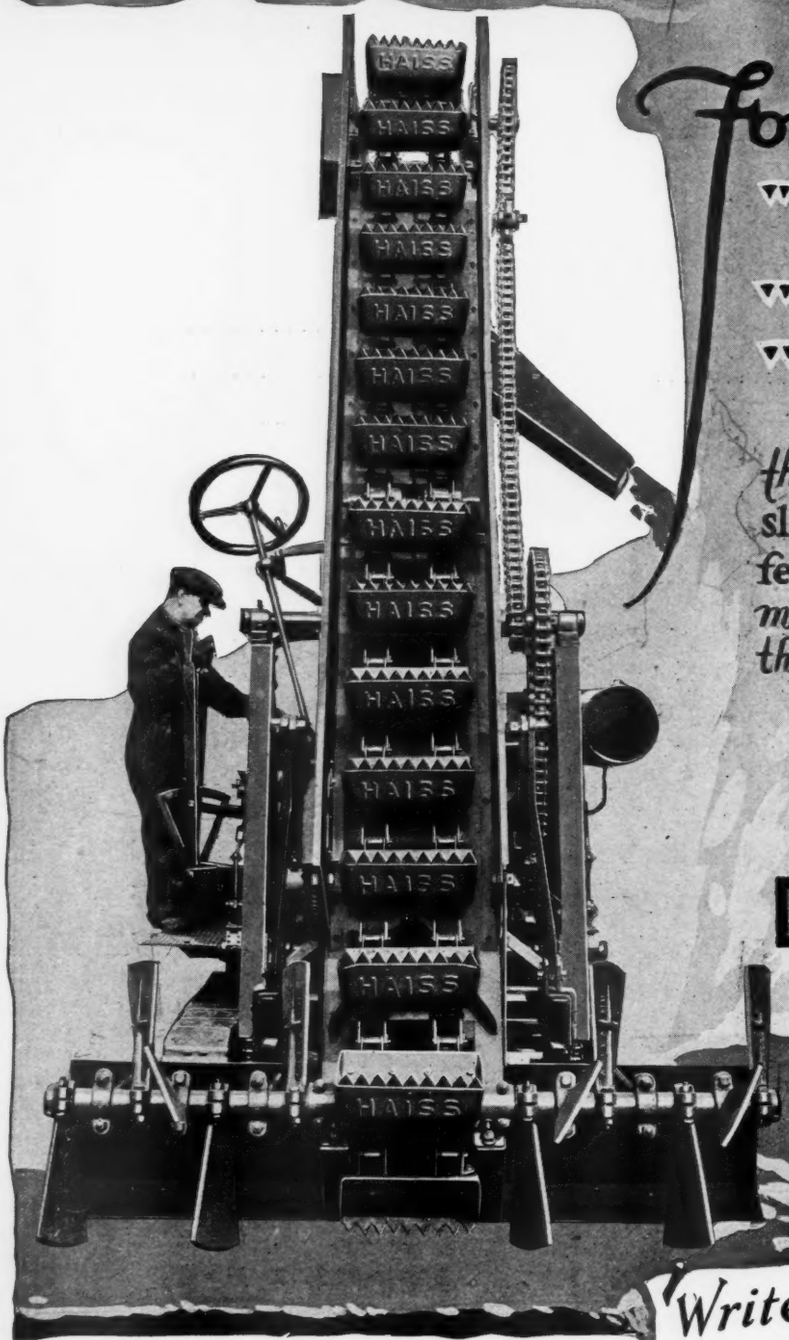

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INDIVIDUALISM IN INDUSTRY VERSUS COOPERATION

DURING the last annual convention of the National Crushed Stone Association at West Baden a very forceful address was made by W. J. Mathews on "Individualism in Industry Versus Cooperation." As we reflect over this address which has been published recently by the National Crushed Stone Association, we think that every group in the Pit and Quarry Industries could profit by studying Mr. Mathews' statements. We decided, therefore, to publish the following extracts from this address because of their vital importance to all groups served by Pit and Quarry.

"Business men today have very definite ideas regarding the proper methods and principles which should be adopted and followed in producing and marketing their own wares. Of course, opinions vary concerning many phases of industrial operation. If there were no divergent views, there would be little need for trade associations or discussions relating to cooperation. It should be noted in the beginning, that I claim no originality in expressing views about what business men should or should not do in the matter of adopting and following policies in conducting their commercial affairs. However this may very properly be stated—that whatever remarks may be made here today affecting legal or industrial questions, they are approved by the highest courts, administrative officials and leading economists, and furthermore, what is perhaps of greater importance, that the principles which I shall advocate have the unqualified approval, without exception, of the most successful captains of industry, whose views concerning these matters have been forged out of experience.

"Col. Wm. J. Donovan, Assistant to the Attorney-General of the United States, on October 28, 1927, in an address at Atlantic City, N. J., entitled: 'Anti-Trust Laws and Foreign Trade,' among other things, said:

"'Trade Associations can perform a legitimate and very important function in industry. Fairly and honestly organized and administered, such associations can well accomplish an essential public service. They can aid in lessening the evils of unrestrained competition, as well as eliminate the motive for corporate combinations. Out of their nature they may obtain all the benefits derived from combinations, as well as preserve the advantages of individual independence. Competition has its evils as well as its virtues. We retain it for its virtues and seek to ameliorate its evils. The result is a compromise and the trade association is a manifestation of that compromise. Its great opportunity is to travel the middle way—to avoid harsh, drastic and destructive competition, yet to be saved from that monopoly which, regulated or not, would stifle initiative and promote bureaucracy.'

"Business men do have the lawful right to cooperate in every reasonable manner for the purposes of developing industry, improving conditions and stabilizing their markets, the doing of which is today regarded as rendering an essential public service. These things are now definitely settled by United States Supreme Court decisions. They are conceded by everyone.

"Formerly, many business men refused to cooperate with competitors, especially through the medium of a trade association, because they felt that the law was not clearly settled. Now, this objection has been entirely removed. But there still remain those who refuse to have anything to do with their competitors. Many reasons are assigned. In the final analysis, the real reason is that such individuals are so constituted that they have an innate aversion toward anything which savors of cooperating with one who is competing for the same business. Such persons prefer to obtain meager knowledge from unreliable sources in a haphazard fashion concerning market conditions. Strange as it may seem, they are ready to accept and act upon misleading and inaccurate statements given to them by those whose interests are diametrically opposed to their own, and that, too, when it is perfectly obvious that the interests of the opposing parties may best be temporarily served by avoiding the truth. To such persons a competitor is always to be treated as a deadly enemy, with whom they have nothing at all in common. In describing business men like those who refrain from cooperating with their competitors, I have endeavored to paint a word picture of him who arrogates unto himself the right to be an individual industrial sovereign, and one who is in nowise concerned with the welfare of all of the others engaged in and dependent upon the same line of business. The necessity of reasonably regulating competition within legal limits, with the

cooperation and assistance of all engaged in the business, is entirely foreign to any ideas entertained by such an individualist.

"Industry has been going ahead so fast that it scarcely has time to adopt rules and standards which operate for the benefit of all. Trade Associations endeavor to supply that need. Business men have come to a realization of the fact that a particular industry as a unit must prosper if the individuals engaged in it are to succeed. A particular industry must be regarded as an entirety in observing proper standards of business conduct which are essential to the rendition of service to the public. An individual policy which may reap an immediate benefit, but damage the industry as a whole, is unsound, because such temporary and immediate gain will, sooner or later, be converted into an offsetting loss. Such methods fail to distinguish between principle, on the one hand, and policy on the other. One cannot injure his competitors without injuring himself in the end. No longer do successful business men resort to bludgeon tactics with the view of demoralizing markets and putting others out of business. Experience teaches that such attempts have been unprofitable. They are utterly futile.

"In every particular industry, the individuals engaged in it must function and work in harmony with reference to the adoption of sound merchandising standards and principles. If these individuals do not work in harmony, not only the individuals, themselves, but the entire industry will not prosper and succeed. This is especially true if the industry in question is in competition with other groups and other industries. Today every salesman, every salesmanager and the head of every firm should understand that when he is dealing with one customer he is dealing with the entire market. Concessions cannot be kept secret, not to mention again the unfairness and injustice of discriminating among one's own customers.

"Today, success in business begins with association, interdependence, organization, cooperation. Industrially, we may well apply an old fundamental rule of law, that every one must so use his property and so conduct himself as not to invade or injure the property or rights of others. Society requires the concession of some part of the individual's sovereignty to the common order and welfare, so that the proper conduct of the individual becomes the welfare of the entire group. Likewise, in every industry, the conduct of each member should be determined in the light of what is best for the industry as a whole. The individuals comprising a group survive in competition with the individuals of another group according to their unity and power, according to their ability to cooperate for common ends.

"Competition, engendered by substitutes between respective groups of manufacturers, has become very keen. Machinery, mass production and strong-arm salesmanship, in order to maintain sales at a high level, have forced cooperation among competitors. Without the stabilization of markets at reasonable levels, which can be accomplished through cooperation, there cannot be sustained prosperity, and without such sustained prosperity profits returned upon capital invested will be grossly inadequate.

"Cooperation among competitors does not mean that there should be a dictator employed for the purpose of dictating, arbitrarily, how any person shall run his business. There is no such thing as compulsory cooperation. Neither does it mean that any individual will be required to surrender his will and his judgment to the opinions of the majority. The work of trade associations is to accurately inform all of the members concerning every phase of the industry and present the facts in such a way that the members may learn what are sound methods and principles of merchandising their products. Having such an understanding they will realize they cannot afford not to adopt them. These things do not mean that competitors, who are cooperating, should agree, either to curtail their production or that they should fix prices, but merely, in the light of complete information, each member, individually, will reach an inescapable conclusion, obvious to everyone who seeks to inform himself, that a plant should not produce goods for which there is not a ready market and which cannot be sold except at a loss. Cooperation necessarily means that the individuals comprising the group will, respectively, so conduct themselves as never to lose sight of the industry as a whole. Unless each member is thoroughly convinced that a certain principle applied to his individual business will be for his own benefit, he should neither be asked nor required to adopt that principle. In other words, cooperation among competitors, which requires any one to do that which is contrary to his own judgment, is, in its inception, doomed to failure. There must be back of every phase of cooperative work the individual conviction that the principles advocated are sound and beneficial, otherwise there will be lacking the spirit and confidence which constitutes the foundation of success in such matters.

"A reasonable restriction of competition is necessary to prevent its becoming ruinous, and a reasonable restraint is lawful. Whatever element of restraint there may be in cooperating along these lines is in the public interest. It helps to bring about stabilization of markets and, consequently, a more healthful and sounder condition in industry.

MEN OF THE INDUSTRY

The portraits printed on this page in each number of PIT and QUARRY are taken from our files and their selection is without significance as to current events or as to the position of the individual in the industry.

B. F. Affleck

Mr. Affleck is President of
the Universal Portland
Cement Company, Chicago, Illinois

MORTON SAND AND GRAVEL ENTERS FIELD WITH NEW MODERN PLANT

WHENEVER a sand and gravel plant is referred to as a model unit an argument is very easily started. However, the new plant recently completed by the Morton Sand and Gravel Company at Wayne, Illinois, about 30 miles from Chicago, is in many respects a model unit for a full load capacity of 2,500 tons per day. The plant represents an economical layout. It is a simple straight line unit. A splendid combination of pumping and belt conveyors for handling the material has been effected.

The deposit contains excellent material in proportions approximating fifty-fifty gravel and sand. An artificial lake is being rapidly created. The property covers nearly 400 acres and is bordered by three railroads although at present shipments are made only over the Illinois Central. The Stephens Adamson Manufacturing Company designed and built the plant and also supplied the conveyors, screens, classifiers, bin gates, etc., as noted. Mr. Colby M. Avery of this company was in charge of the design and construction. The Morris Machine Works supplied the dredging unit. All the belt conveyors are the Simplex type equipped with Timken bearings.

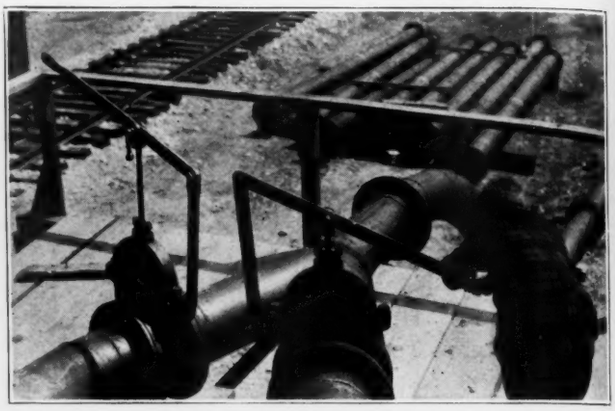
The dredge is a Morris layout. It is 20 by 40 feet and has a wooden hull in three sections. A 12 inch Morris pump, driven by a 300 h. p. 3 phase 60 cycle 440 volt General Electric motor, does the pumping. A 3 inch Morris pump, driven by a 10 h. p. General Electric motor, is used for priming. The suction line is at one end of the dredge and raised and lowered by a three drum Flory hoist operated by a 40 h. p. General Electric motor. The discharge line runs above the floor of the dredge and out the rear end through 600 feet of 12 inch steel pipe to a sump. There are at present 20 sections of pipe in the line, fourteen of which are supported on pontoons and six on land. This will be corrected as the artificial lake is created. It is planned to have the dredge working around 600 feet from shore.

View Showing the Dredge

The pipe line from the dredge discharges to a sump. This discharge can be delivered to either one side or the other of this sump by valve controlled shunt near the end of the line. The line proper is carried to the far side of the sump while the shunt line is carried to the other side. This flexible arrangement is quite a feature. It means that the discharge from the dredge can be switched

General View of the Plant

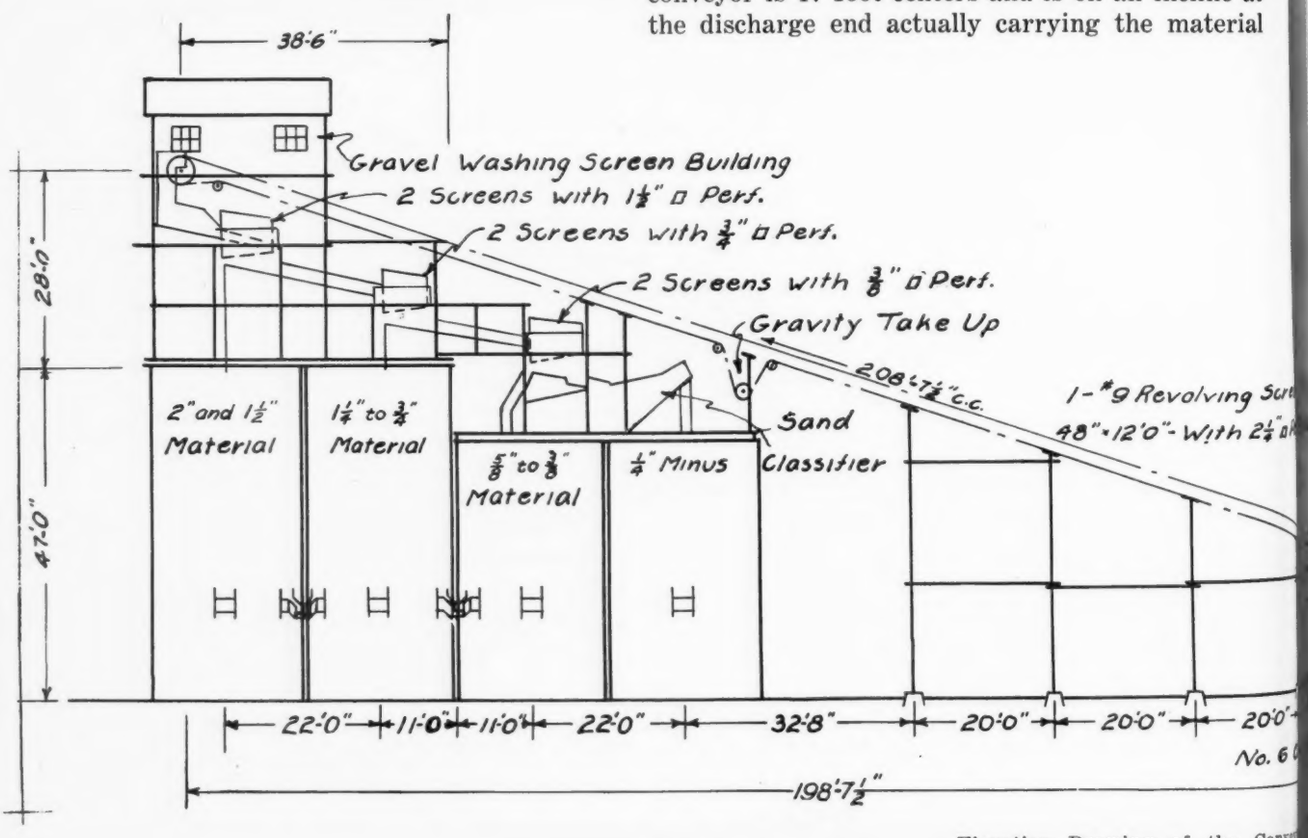
Close-Up of One of the Gravity Take-Ups



Valve Control for Sump

from one side of the sump to the other when necessary and will eliminate considerable shutting down of the pump. This dual arrangement also facilitates drainage and increases the capacity of the shovel that rehandles the material in the sump. The water in the sump drains to a sluice 36 inches wide that delivers back to the deposit. A sand and gravel filter with a weir gate control has been built in the deposit to control the return waste from the sump.

A 50B Bucyrus shovel with a 1½ yard clamshell bucket picks up the material from the sump and discharges it to a hopper with pipe grating. This hopper is fitted with a Stephens Adamson gate which controls the discharge to an underground 30 inch Stephens Adamson belt conveyor with Simplex carriers and return rollers. This conveyor is 47 foot centers and is on an incline at the discharge end actually carrying the material



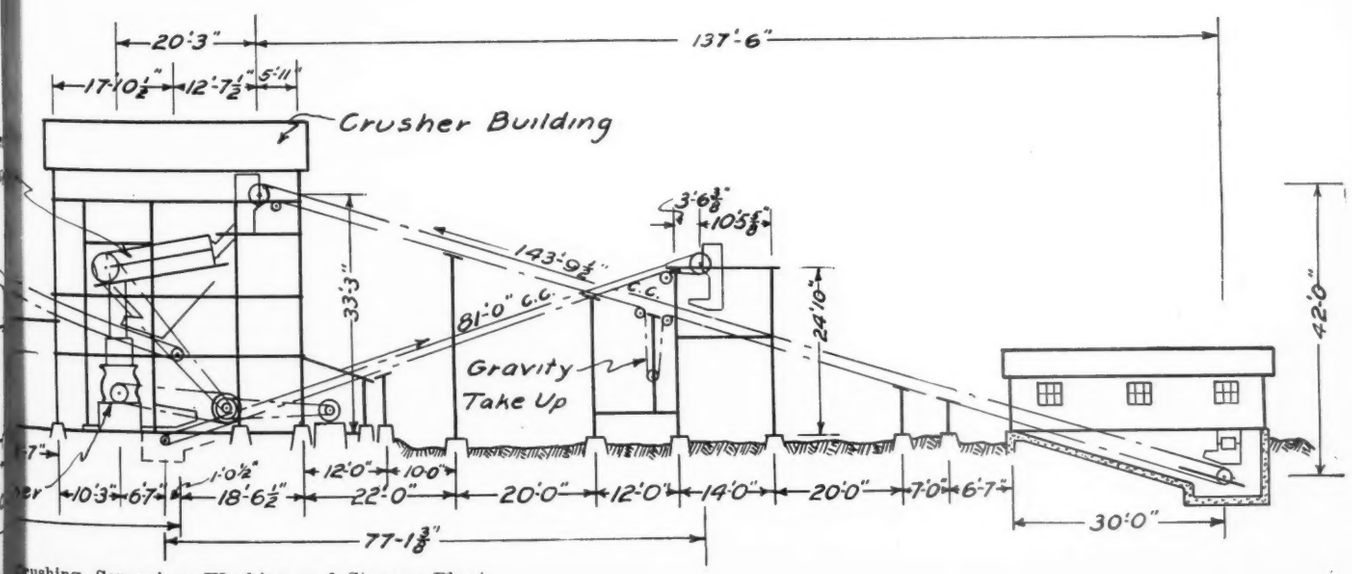
Elevation Drawing of the Conv

View Showing Control for Taking Material from Hopper

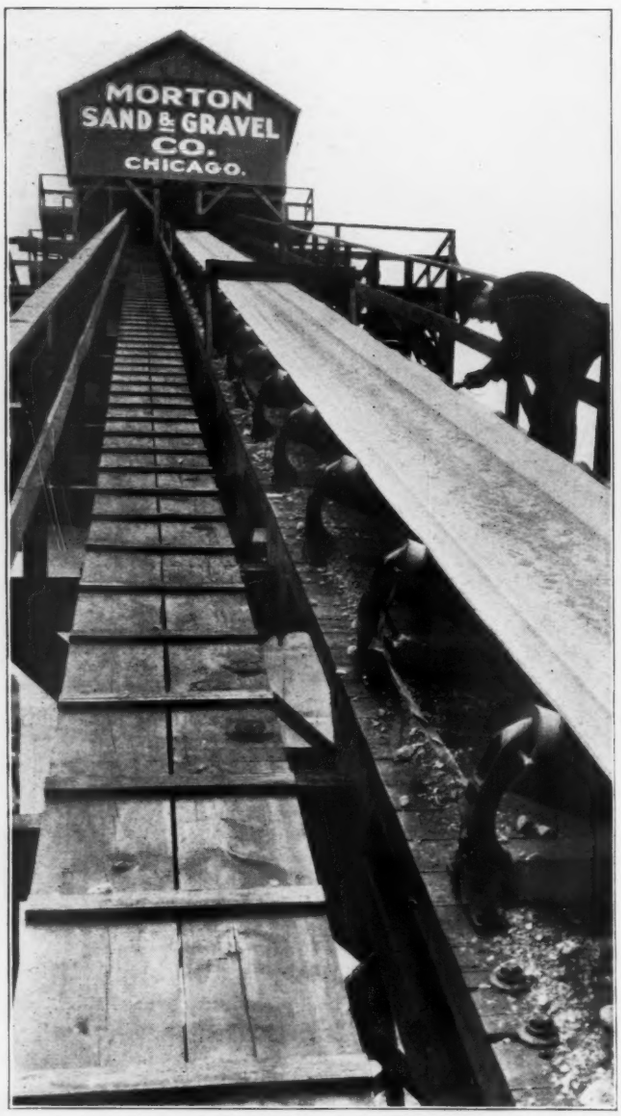
a horizontal distance of 44 feet. This conveyor has a capacity of 300 tons per hour at 300 feet per minute.

The discharge from this first belt conveyor is taken by a second belt conveyor, which, in turn, discharges to the scalping screen. This second belt conveyor is 30 inches wide 143 feet 9½ inches centers and has a capacity of 350 tons per hour at 300 feet per minute. It is equipped with a Stephens Adamson gravity take-up.

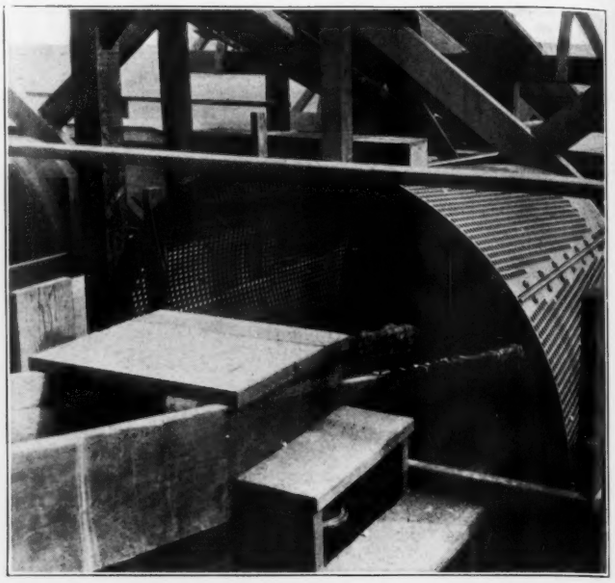
The scalping screen is housed in the crusher building. This screen is 48 inches in diameter, 12 feet long and has 2¼ inch square openings. The oversize is dropped to a number 6 Style K Allis Chalmers gyratory crusher belt driven directly below. The material passing through the screen is delivered to another 30 inch belt conveyor, 208 feet 7½ inches centers, that delivers to the screening and washing plant. This conveyor is also equipped with a Stephens Adamson gravity take-



Crushing, Screening, Washing and Storage Plant



Conveyor to Grading Screen



Close-Up of One of the Screens

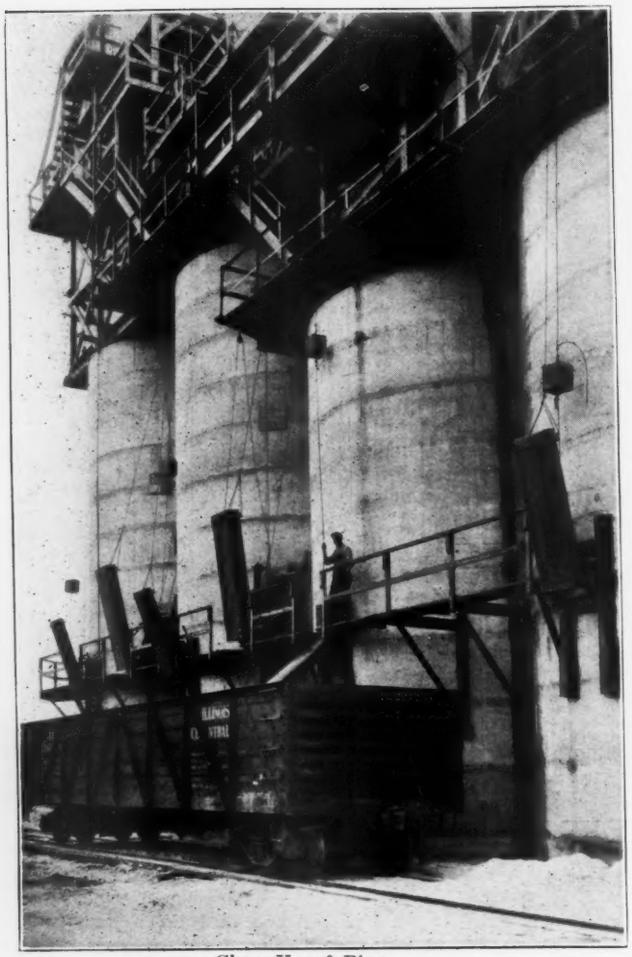
up. This conveyor has a capacity of 300 tons per hour at 300 feet per minute. The discharge from the crusher is taken by a 24 inch belt conveyor, 81 foot centers, back into the system by discharging into a hopper which feeds the second belt conveyor delivering to the scalping screen. This crusher conveyor has a capacity of 50 tons per hour at 300 feet per minute.

The washing and screening plant is a dual system. This is the second feature of flexibility to be noted. One half of this end of the plant can be shut down when necessary. The first two screens are special Gilbert units with 1½ inch openings. The 1½ inch plus material drops to the first bin. The minus 1½ inch material is delivered to a sec-

Shovel Working in Sump

Looking Over the Sump Towards the Plant

Close-Up View of the Classifier



Close-Up of Bins

ond set of two screens. These screens are special Gilbert units with ¾ inch openings. The ¾ inch to minus 1½ inch material drops to the second bin. The minus ¾ inch material is delivered to a third set of two special Gilbert screens with ⅜ inch openings. The ⅜ inch to minus ¾ inch material is dropped to the third bin. All the minus ⅜ inch material with the water is delivered to a Stephens Adamson sand classifier which reclaims the minus ¼ inch material that is dropped into the fourth bin.

There are four concrete circular storage bins. They are each 22 feet in diameter. The first two are each 47 feet high. The second two are each 43 feet high. Each bin is equipped with spouts for loading on both sides with 24 by 18 inch Stephens Adamson quadrant gates. Bins one and two and also two and three have mixing spouts on one side so that a mixture of the plus 1½ inch and the plus ¾ inch minus 1½ inch can be made and also a mixture of the plus ¾ inch minus 1½ inch with the plus ⅜ inch minus ¾ inch material. Four straight sizes can be delivered from the bins and also two mixed sizes. A Stephens Adamson car puller is used handling the cars against gravity and for spotting. The cars move down by gravity. Material will be shipped over three railroad lines and by truck in the near future. At present, shipments are being made over the Illinois Central.

A View of One Side of the Sump

NEW CONCRETE AND ALL STEEL SLAG PLANT HAS MANY IMPORTANT FEATURES

A NEW all-steel and concrete slag plant was started in operation on May 7th of this year by the France Slag Company, at East Toledo, Ohio. Actual completion of the plant, however, has only just been accomplished. The need for starting crushing operations at the earliest possible moment was very urgent, because of the fact that the Toledo Furnace Company, in whose yards the new plant is located, had begun to be crowded for pouring space for the hot slag, the former crushing plant having been destroyed by fire in August of last year. The first slag crushed was so hot, even after being sprayed, that it would severely burn if a piece of slag was picked up with the bare hand.

The trend among crushed stone and slag users is to demand a cleaner and more accurately sized product, and, because of this fact, features were incorporated into the new plant to provide for the making of an almost perfect product.

These features are a steady feed of material to the crushing and screening equipment, ample screening and re-screening equipment, and screening apparatus for a final cleaning of material just prior to loading into cars.

Briefly outlined, the flow of slag from the furnaces on through the plant is as follows: Furnaces to ladle cars, to slag cooling pits, to railroad hopper cars by means of steam shovel, to foot of incline by means of steam locomotive, up incline by means of electric hoist, into 65-ton capacity track hopper, over reciprocating plate feeders, over apron conveyor used as picking table for large pieces of iron, to revolving disc scalping grizzly, to No. 8 gyratory crusher, to heavy chain type bucket elevator, to magnetic separator belt, to 72-inch by 30-foot revolving screen, to revolving disc re-screening grizzly and 60-inch by 40-foot revolving screen, to one Traylor sizing vibrator and one Traylor re-screening vibrator and one Niagara re-screening vibrator, into the bins, over loading belt conveyors, to a revolving disc cleaning grizzly and a Traylor cleaning vibrator, to the cars for shipment.

The molten slag is hauled in ladle cars a distance of about 3,000 feet, where it is dumped into the cooling pits, which are about 90 feet wide by 700 feet long by 20 feet deep.

If any iron is drawn from the furnace with the slag it will of course settle to the bottom of the ladle cars. During transportation to the slag pits this iron sometimes cools sufficiently to solidify, and, conforming to the ladle bottom, usually forms into a sort of skull-cap shaped piece. These

View of Plant From Northeast Loading Screen House in Foreground

"skulls" often weigh as much as 4,000 pounds and add considerably to the labor cost and machinery breakage hazard of the operation. The width and depth of the slag pits determine the thickness of the strata that each pour of hot slag will solidify to, the wider the pits with a given depth, the thinner the stratification.

The model 95 Bucyrus crawler equipped steam shovel can dig a cut about 63 feet wide, but in order to prevent the forming of too great a percentage of the finely stratified material, the double cut pits are kept narrowed down to approximately a 90-foot width. The depth of the pits is limited by the water level of the Maumee River which flows along the side of the pits. Rough slag is dug from the pits by the shovel and loaded in fifty-ton capacity railroad hopper cars, which are hauled to the foot of the incline by a thirty-ton Vulcan steam locomotive.

The cars are elevated one at a time up an incline of about three inches to the foot and about 190 feet long, at a speed of 100 feet per minute by a specially designed motor-driven hoist. The hoist was designed by D. W. Yambert of the France Slag Company and was built by The France Foundry and Machine Company, a subsidiary of The France

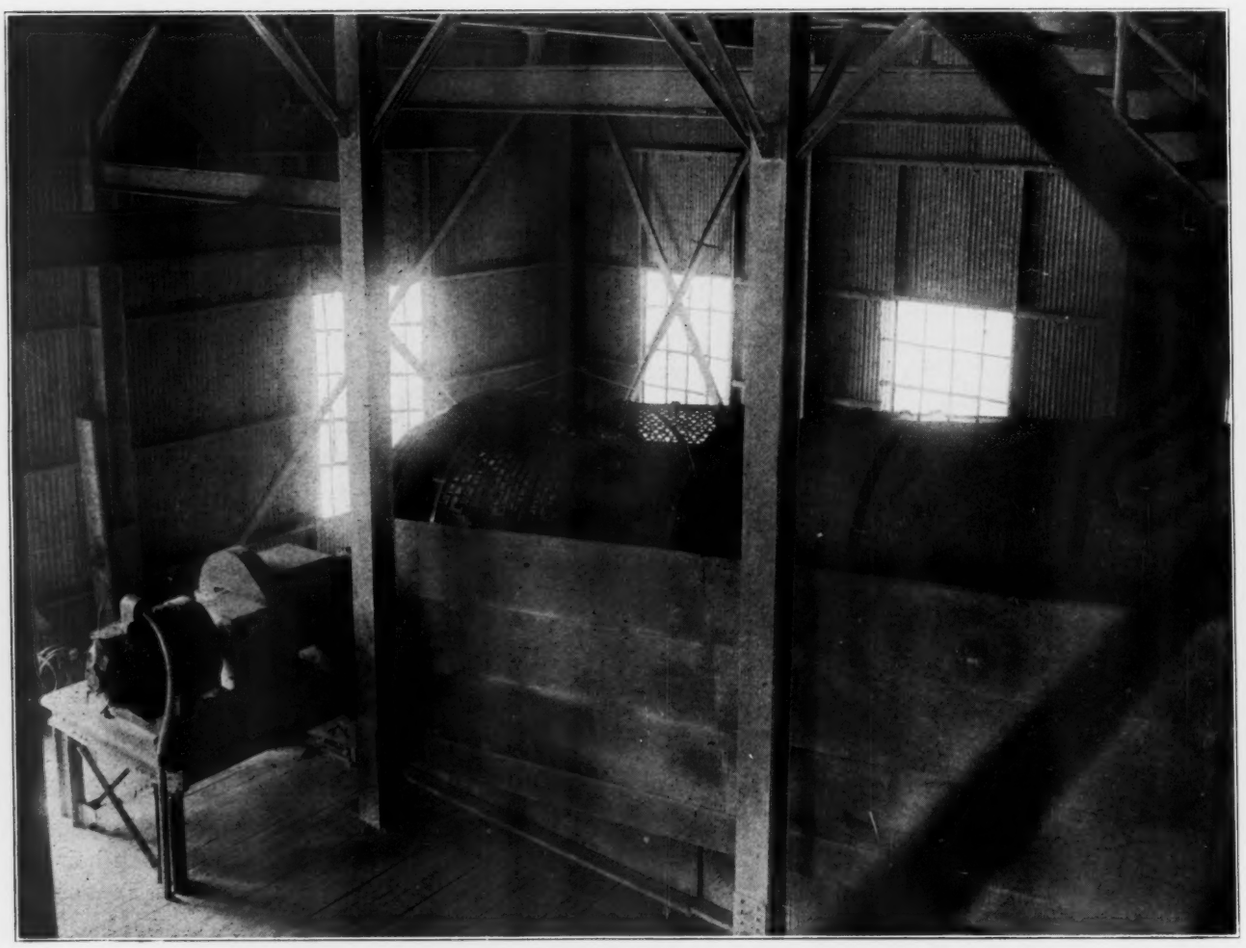
Scalping Disc Grizzly Ahead of No. 8 Crusher

Slag Company. The 1¼-inch diameter hoisting cable is wrapped on a grooved drum 36 inches in diameter and 36-inch face.

A General Electric totally enclosed direct current series wound crane type motor drives the winding drum through one reduction of cut steel gears and two of cast steel gears. Starting and stopping can be accomplished by means of push button stations, the remainder of the operation, however, being entirely automatic. Acceleration is controlled by pendulum equipped time relays.

During lowering, the motor is reconnected so as to become somewhat of a generator, the generation of current serving to retard the speed of the car. If the car attains a speed that will cause the generation of 135 per cent of normal voltage, an overspeed relay will operate which removes some resistance from the circuit and causes the generator (so called) to load up, thus further retarding the car.

A chain driven geared type limit switch automatically stops the car at a pre-determined point at the top of the incline, and both slows down the car and stops it at the foot. The car of rough slag is dumped into a 65-ton capacity self-cleaning steel track hopper, the bottom of which is equipped with two 42-inch by 19-foot long reciprocating



A 72 Inch by 30 Foot Revolving Screen With Drive

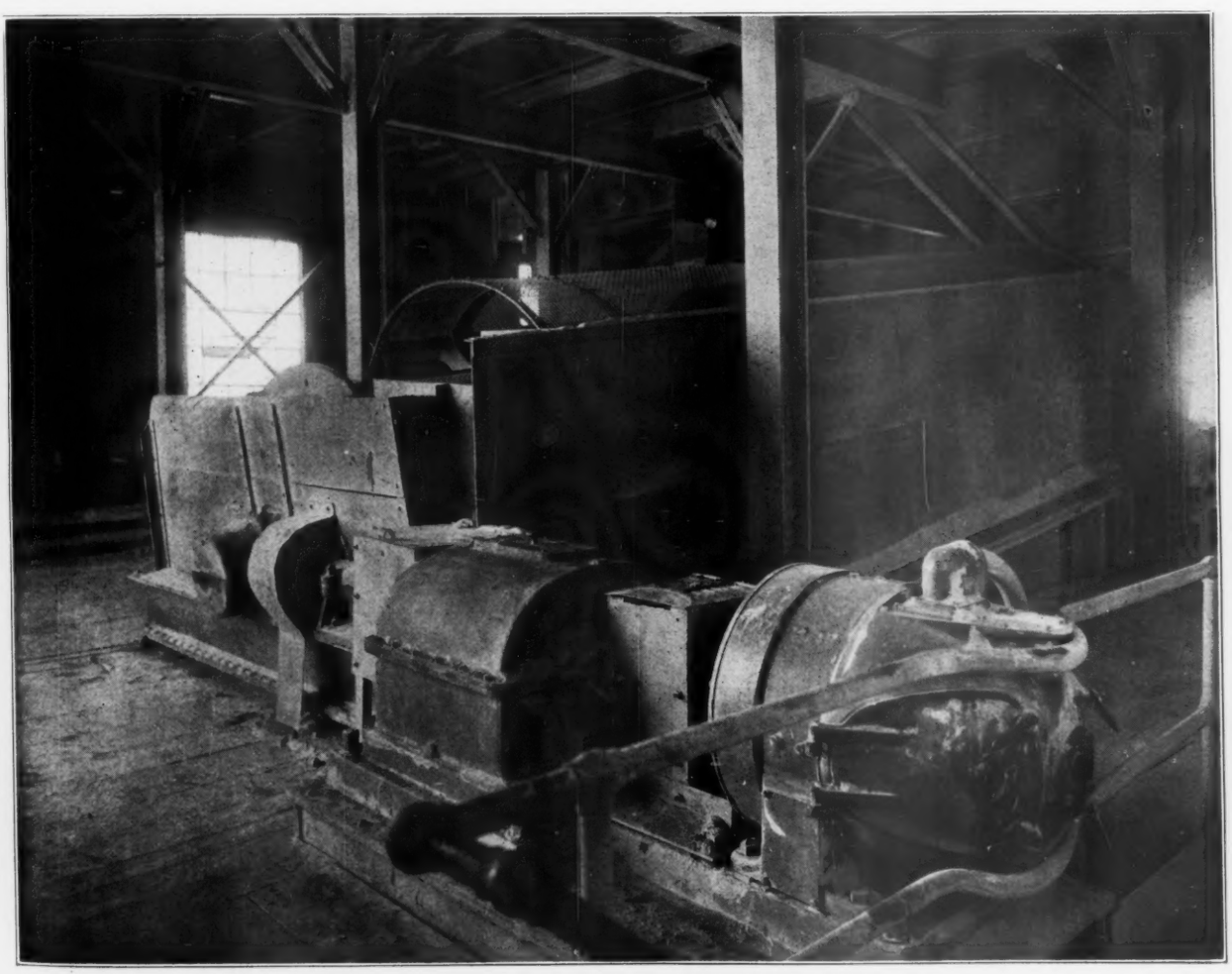
plate feeders, either or both of which may be run at any one time.

The cranks of these feeders are adjustable throw, thus making it possible to accurately set and control the feed to the plant, which is extremely important where careful screening and sizing are required. From the ends of the feeders the slag drops onto a 48-inch wide by 36-foot center steel apron conveyor, where two men are kept busy watching for and removing pieces and skulls of iron. A nearby safety switch will stop the apron conveyor and feeders to permit the men to more conveniently remove the large pieces of iron. A gib crane is provided for lifting the iron, swinging it out of the way, and dropping it into a car below.

Discharged from the end of the apron conveyor onto a Robins 5 shaft, 42 inches wide, 16 inches disc diameter, revolving disc grizzly, the slag below 4 inches square is removed and by-passed around the crusher into the bucket elevator, and the slag over 4 inches in size passes over the grizzly into the No. 8 gyratory crusher, where it is reduced and discharged into the bucket elevator.

The use of the scalping disc grizzly insures that none of the slag already of the maximum produc-

Track Hopper, Reciprocating Plate Feeders and Apron Conveyor Picking Tables



A 60 Inch 24 Foot Revolving Screen and Drive

tion size or under can be further reduced by passing through the crusher. If a greater maximum size of product is desired than 4-inch square, the openings of the disc grizzly can be increased to 4¼-inch by the addition of disc-spacer washers.

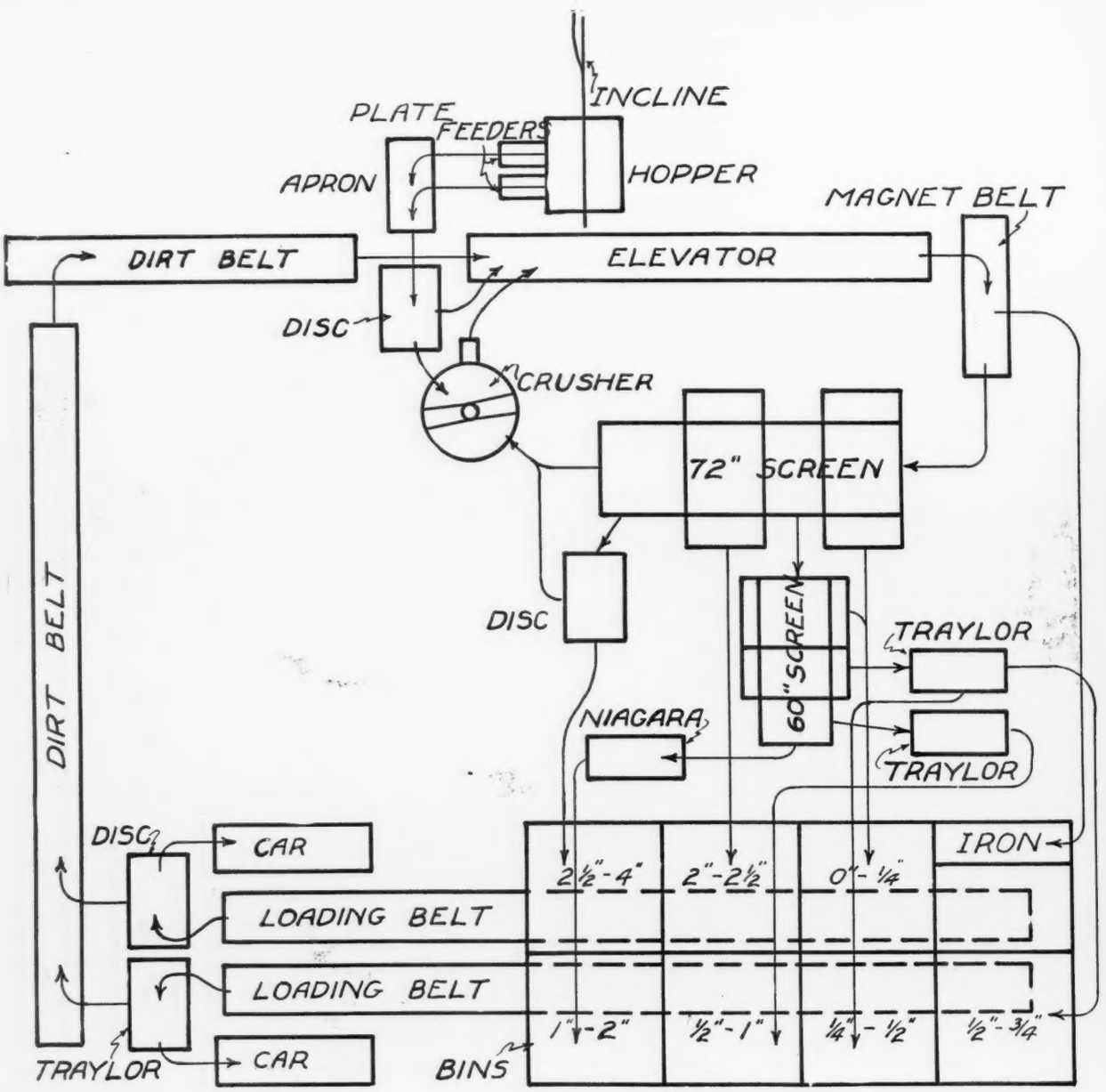
The number 8 gyratory crusher is driven through a texrope drive. The crusher motor control is arranged so that the crusher can be run only in the forward rotation, but for convenience in starting when full of slag can be jogged either forward or reverse.

The panel contains dual overload protection, a temperature overload relay, the latter being equipped with a normally closed contact and a normally open contact, which, upon tripping of the relay, respectively open the forward contactor and close the reverse contactor.

Actual reversal of the motor rotation, however, is prevented by a friction relay mounted on one end of the motor shaft, which at the instant the motor's rotation begins to reverse opens the control circuit to the reverse contactor, thus permitting the motor to remain at standstill after having been brought to an abrupt stop.

The setting of this relay is such that ordinary slag crushing will not trip it, but that a piece of iron in the crusher will, in which case the crusher will automatically be ply-stopped, thus avoiding the possibility of a broken or bent crusher stem. An emergency stop, push button station is provided which will also ply-stop the crusher for extreme emergencies, such as a man falling into the crusher.

A Webster all-steel heavy roller-chain type bucket elevator 36 inches wide by 129-foot centers at a slope of 6 3/16 inches horizontal to 12 inches



Flow Sheet of Mill

vertical, with super-capacity buckets designed to carry large tonnage on steep slopes without spill, elevates the slag to the top of the screen house and discharges it onto a 48-inch wide by 13-foot centers magnet belt equipped with a 24-inch diameter by 48-inch, 2,650-watt Dings magnetic separator pulley. All remaining pieces of iron are removed by this magnetic separator pulley and chuted to a small iron bin located in the corner of one of the slag bins.

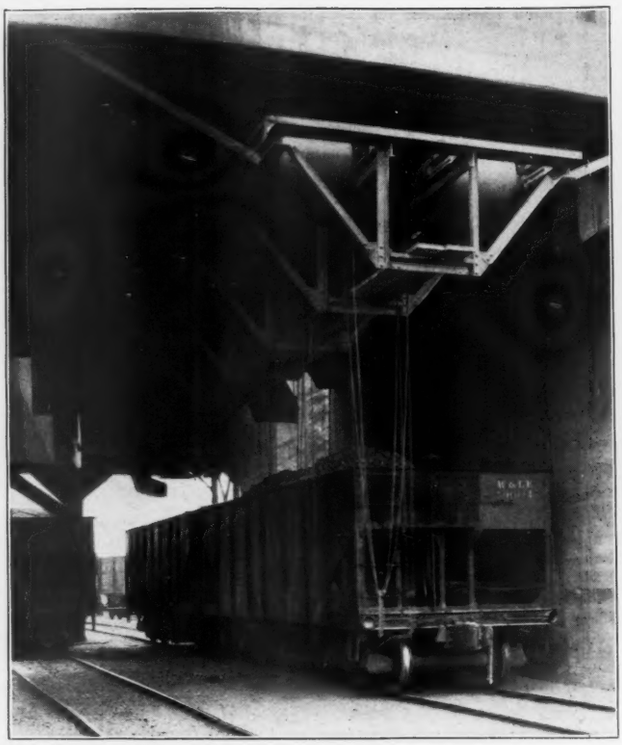
The motor driving the bucket elevator is equipped with a magnetic brake which will automatically set in case of power failure, thus preventing the overhauling of the elevator if loaded, and avoiding the damage that would result in such a case.

A 72-inch by 30-feet all-steel Allis Chalmers revolving screen running at 10½ r.p.m. receives slag from the magnet belt and separates it into the following sizes: 4 inches and up, 2½ inches to 4 inches, 2 inches to 2½ inches, 0 inches to 2 inches.

Rejections (material over 4 inches) are discharged off of the end of this screen and chuted back to the crusher. The 2½ to 4 inch size goes to a Robins 5 shaft, 30 inches wide, 9 inch disc diameter, revolving disc grizzly which removes all carry over and spalls below 2 inches and discharges directly into the bin. Material 2 to 2½ inches from the 72 inch revolving screen passes directly to its bin. The 0 to 2 inch slag chutes to the next floor below, to a 60 inch by 24 foot revolving screen designed by the slag company's engineers and built by the France Foundry & Machine Company. This screen separates the 0 to 2 inch material into

View of Plant From South

Head of Bucket Elevator and Also Speed Reducers and Safety Coupling Enclosures



Loading Belt Conveyors

the following sizes: 1 to 2 inch, ¾ to 1 inch, ¼ to ¾ inch, and 0 to ¼ inch.

The 1 to 2 inch goes to a number 3 Niagara vibrator screen fitted with ⅜ inch square opening cloth, which removes all undersize and discharges the sized material into the bin. ¾ to 1 inch slag is carried by chute to a number 2 FB Traylor vibrator screen fitted with ⅜ inch square opening cloth, which removes any fine material and discharges into the bin. A number 2 FB Traylor double deck, vibrator screen takes the ¼ to ¾ inch size, removing undersize material and making a further separation into ¼ to ½ inch, and ½ to ¾ inch sizes, which sizes go directly to their respective bins. The 0 to ¼ inch from the 60 inch revolving screen goes directly to its bin.

There are eight 11 feet 6 inch by 15 feet 4 inch by 20 feet deep, 132 ton capacity slag bins, built of reinforced slag-concrete, and arranged in two rows of four bins each. The two rows of bins span two loading tracks, a span of 29 feet without center support.

Each bin is equipped at the bottom with three Blaw-Knox plate and roller type non-jam loading gates, one of which is regularly used and discharges onto a loading belt conveyor, the remaining two gates being for emergency use in loading directly into cars beneath the bins. Each bin contains just one size material and mixtures are never made in the bin. This practice eliminates the need for a multiplicity of chutes and flop gates, etc., for obtaining mixtures of various sizes of product in the bins.

1200 Ampere Four Pole Main Power Disconnecting Switch

An advantage other than the simplification of chutes accrues to this scheme, and that is the elimination of the possibility of giving a customer some wrong sized material just after a change of mixture is made, if the bin has not been previously emptied completely of the former mixture that it contained.

Of course mixtures are required and must be made in some manner or other. At this plant any desired mixture is quite accurately obtained as the material is discharged through the gates onto the loading belt conveyors. The opening of the gates for the various sizes to be mixed can be adjusted to deliver the desired percentage of each size.

Under the bins there are two 30 inches wide by 90 foot centers loading belt conveyors, one for each row of bins. One carries the 2½ to 4 inch and 2 to 2½ inch sizes, and the other carries the 1 to 2 inch, ¾ to 1 inch, ½ to ¾ inch and ¼ to ½ inch sizes. These conveyors run horizontally until out from under the bins, when they change abruptly over bend pulleys to elevate their load to final clearing screens which discharge into cars for shipment. Long hinged loading chutes which can be lowered into the cars are provided so that there will be a minimum of breakage during loading.

The cleaning screen for the coarser sizes is a Robins 7 shaft, 36 inches wide, 9 inch disc diameter, revolving disc grizzly with 2 inch square openings. The belt carrying the smaller sizes discharges to a number 2 FB Traylor vibrator cleaning screen equipped with ¼ inch square opening wire cloth. Dirt, so called, that is removed by the cleaning screens is returned by underground belt conveyors to the plant bucket elevator, and is re-elevated, sized and sent to the proper bins.

Individual motor drive is used throughout the

plant. All motors except the hoist motor, which has already been described, are General Electric, totally enclosed, fan cooled, ball bearing, compound wound, 230 volt direct current motors. Direct current power is the most economical power to use in this case because of its being manufactured in the same yards by the furnace company.

The totally enclosed and ball bearing features of the motors should practically eliminate the commutator and winding and bearing trouble that would undoubtedly be experienced with open type sleeve bearing motors operating in the dense iron and acid laden dust always present in slag plants.

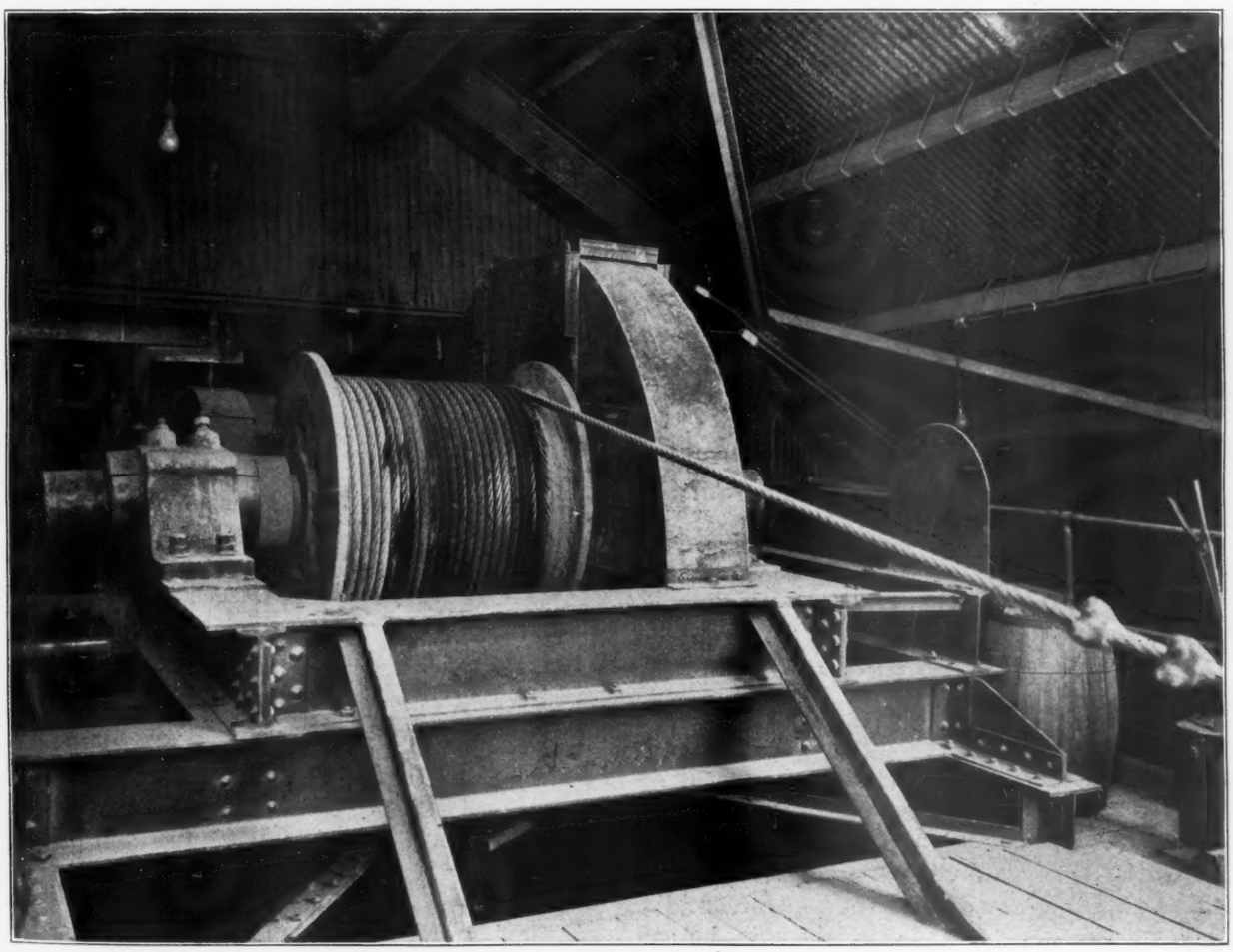
All drive reductions except the crusher drive are encased speed reducers running in an oil bath. Two of these are W. T. Jones Foundry and Machine Company's, spur gear reducers, and all of the remainder are Farrell-Birmingham Company's Sykes herringbone reducers.

Speed reducer drives were installed to save space and to have a practically trouble proof and attentionless drive. All motor starters are General Electric enclosed magnetic starters with time acceleration and with temperature overload protection, and all push button stations are of the dust proof type.

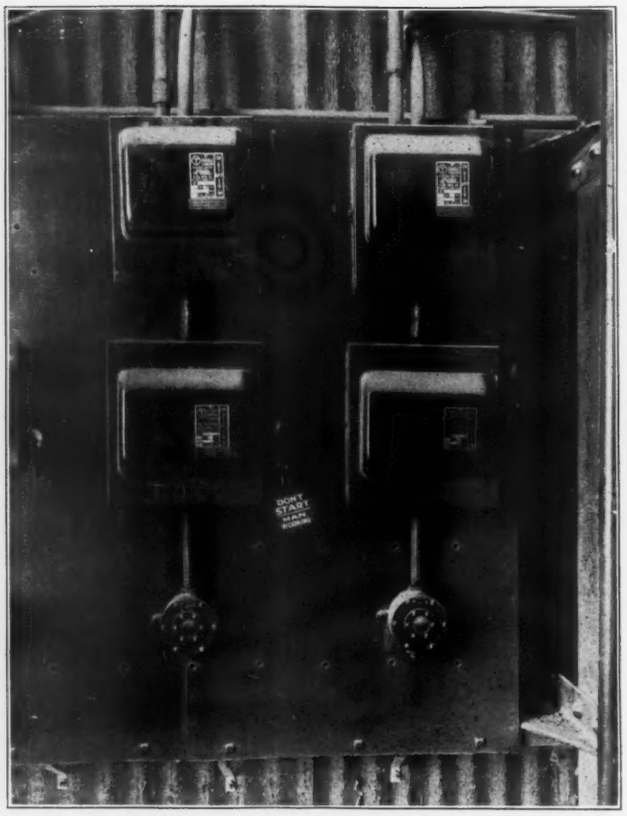
The starters for the motors of the crushing and screening operation are electrically interlocked in such a manner that the pressing of one push button station will start all motors, one after another, in a sequence in the opposite order to the flow of slag through the plant; and such that should a motor stop from any cause, all motors driving machines feeding slag to the machine that has stopped will automatically shut down, thus avoiding the piling up of slag on that machine and the damage that such piling up of material might cause.

For safety of operation, a Run-Stop-Safe-Jog station is provided near each machine. The station is composed of a double throw safety switch and a momentary contact push button. The safety switch for a particular machine must be in the upper throw or "Run" position in order that that machine and machines feeding that machine may run. The switch, if pulled to the neutral or "Stop-Safe" position, will prevent a particular machine and machines feeding it from running.

In order to insure that the switch for a particular machine will not be thrown to "Run" position while a mechanic is working on that machine, a harness snap fitted safety tag bearing the name of the mechanic and marked "Don't Start—Man Working," is snapped into the switch handle in the "Stop-Safe" position.



Heavy Hoist for Elevating Railroad Hopper Cars



Two Control Stations

The safety switch for a certain machine, when thrown to the down throw or "Jog" position, destroys the sequence circuit for the machine feeding that machine, thus preventing them from running, but permits that particular machine to be jogged by the pressing of the momentary contact "Jog" push button. Jogging is oftentimes very important during repair work, therefore the provision of this latter feature was considered essential.

In case of trouble developing on one of the machines that is not vital to the operation of the plant, such as a re-screening screen, it might be desirable to remove it temporarily from the sequence control without, of course, affecting the remainder of the sequence. For all such machines a special Trumbull two position no neutral safety selector switch, marked "In"-"Out," is added to the regular Run-Stop-Safe-Jog station. The upper, or "In," position provides for operation of the machine in the sequence, and the lower, or "Out," position provides for eliminating the machine from the sequence without destroying the sequence for the remaining machines.

Ahead of each motor starter there is installed a safety disconnect switch which, when opened, removes the power from the starter and motor. If, when it is necessary to work on the motor or starter, the workman will open this disconnect switch and also the switch for the control circuits, and lock them open with the safety tags, he can proceed with absolute safety.

There have been some cases where, in the excitement of some emergency, a workman has opened the disconnect switch under heavy load, drawing an enormous arc which melted the copper of the switch and formed sufficient gas within the switch case to burst it, causing the workman to receive mechanical injury as well as to be severely burned.

This hazard has been guarded against by having the Trumbull Electric Manufacturing Company build special disconnect switches provided with an auxiliary contact which must be opened before the switch can be opened. The auxiliary contact is connected in series with the control circuit of the motor starter. Therefore, when the auxiliary contact is opened the motor starter contactors drop out and break the arc with their magnetic blowouts, before the disconnect switch can be opened.

The 1,200 ampere, four pole main power entrance disconnect switch is also equipped with an auxiliary contact connected in series with the control circuit to all motor starters. It is therefore impossible for this main disconnect to be opened without first having the current load removed by the dropping out of the various motor starters in the plant. For safety and permanence, all electric wiring was done in rigid sherardized conduit.

Two electric sirens, specially built to obtain the desired high pitch, are used for warning signals prior to starting the plant. Besides the electrical safety features mentioned, the mechanical accident hazards have been eliminated to the greatest extent. All gears and couplings are completely enclosed with convenient inspection plates and doors provided. All machinery is carefully guarded with suitable railing or other steel barrier. All stairways and other openings are provided with standard pipe railing and standard toe boards. Machines are piped for lubrication in such a manner that it is not necessary for workmen, while lubricating, to be exposed to any appreciable hazard.

The plant was designed by the slag company's own engineers. The organization in direct charge of the construction was as follows: G. G. Black, district superintendent; B. W. Cochran, resident superintendent; H. W. Schaub, mechanical engineer; D. W. Yambert, mechanical and electrical engineer; Harry Abbott, construction foreman; Elmer Howell, chief electrician.

German Lime Registers Improvement

Statistics of the German Association of Lime Industries just made available for the first quarter of 1928, show a notable improvement in sales of limestone and lime as compared with the corresponding period of 1927. It is reported, however, that during March and April the market for lime was rather quiet.

SUBSTANTIAL CONSTRUCTION AND DESIGN PAYS L. G. EVERIST, INCORPORATED

L. G. EVERIST, Incorporated is one of the large builders supply companies of the Middle West. Several offices and yards are maintained in different parts of the territory which it serves and, to provide material for distribution, sand, gravel and stone plants are being operated. The principal offices and yards are located at Sioux City, Iowa.

At present, three plants are in operation to supply sand, gravel and crushed stone to the large clientele which has been built, during the years that L. G. Everist has been serving them. The sand and gravel plants are at Sioux Falls, South Dakota, and Hawarden, Iowa; the crushed stone quarry, yards and crushing and refining plant are at Dell Rapids, South Dakota. Of these, the sand and gravel operation at Hawarden and the crushed stone plant at Dell Rapids are of interest, since the crushed stone plant was recently acquired and rebuilt; and the sand and gravel operation is of comparatively recent construction.

Dell Rapids Plant

Haywarden Plant of L. G. Everist

Storage Crane at Haywarden

The Sand and Gravel Plant

The Hawarden sand and gravel operation is located at Hawarden, Iowa, on 95 acres of tested gravel bearing property. Its gravel deposit, which has an average of three feet of overburden, includes 28 feet of workable material of which ten feet lies below water level. The gravel content runs between 28 and 30 per cent which is retained on a ¼ inch screen. Trackage is so arranged that pit run material may be loaded into railroad cars for road ballasting purposes as well as permitting a locomotive to pass through on the service tracks to switch the plant when necessary.

The plant, which is of structural steel, fabricated and erected by the Worden Allen Company, is fed by two units. The first is a two yard Monighan skid and roller dragline which loads a standard gauge, 20 yard, type CD Koppel drop side air dump car. This car is hauled to the receiving hopper by a 50 ton, 16 by 24 inch American saddle tank locomotive.

Unit 2 consists of a class C-14 Bucyrus two yard skid and roller drag line which loads three five yard Koppel dump cars. They are hauled to the receiving hopper by a 10 by 10 inch, 36 inch gauge Porter saddle tank locomotive.

Showing Close-Up of Dell Rapids Quarry

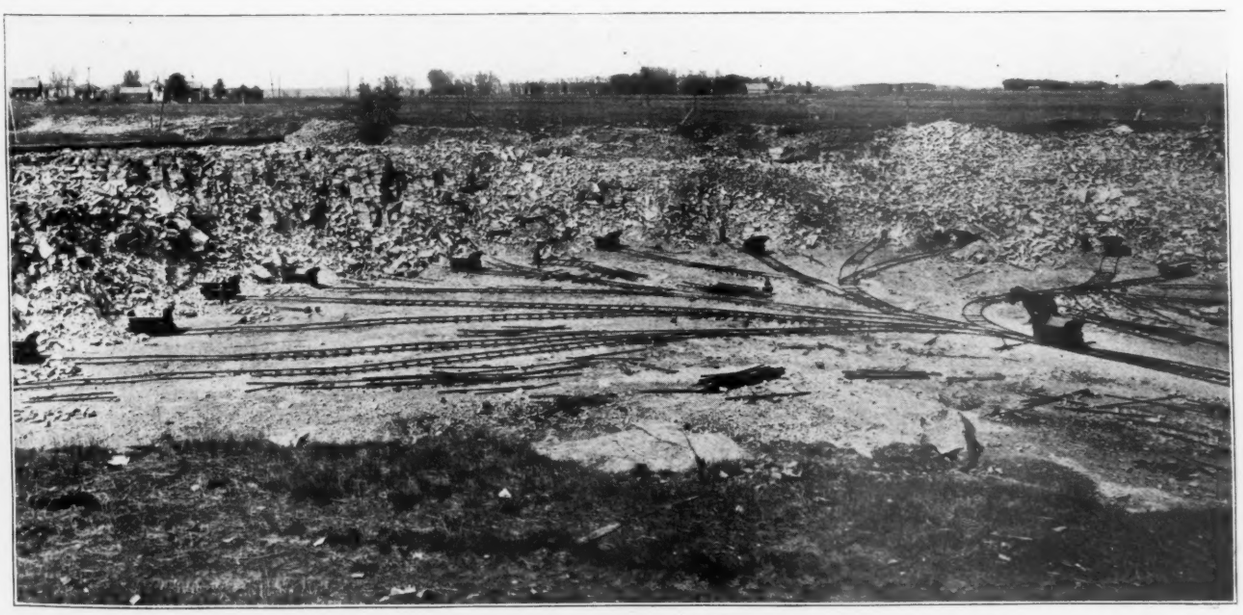
Dragline in Operation at Haywarden

The material passes to a 7 by 7 inch grizzly which is mounted on a 100 ton capacity hopper and flows into a 24 inch double pan feeder and is taken to the primary conveyor. All conveyors are equipped with Dodge Timken roller carriers and Chain Belt vertical take ups. Goodyear 24 inch, 6 ply, 1/8 inch top, 32 ounce klingtite belting is used throughout the plant.

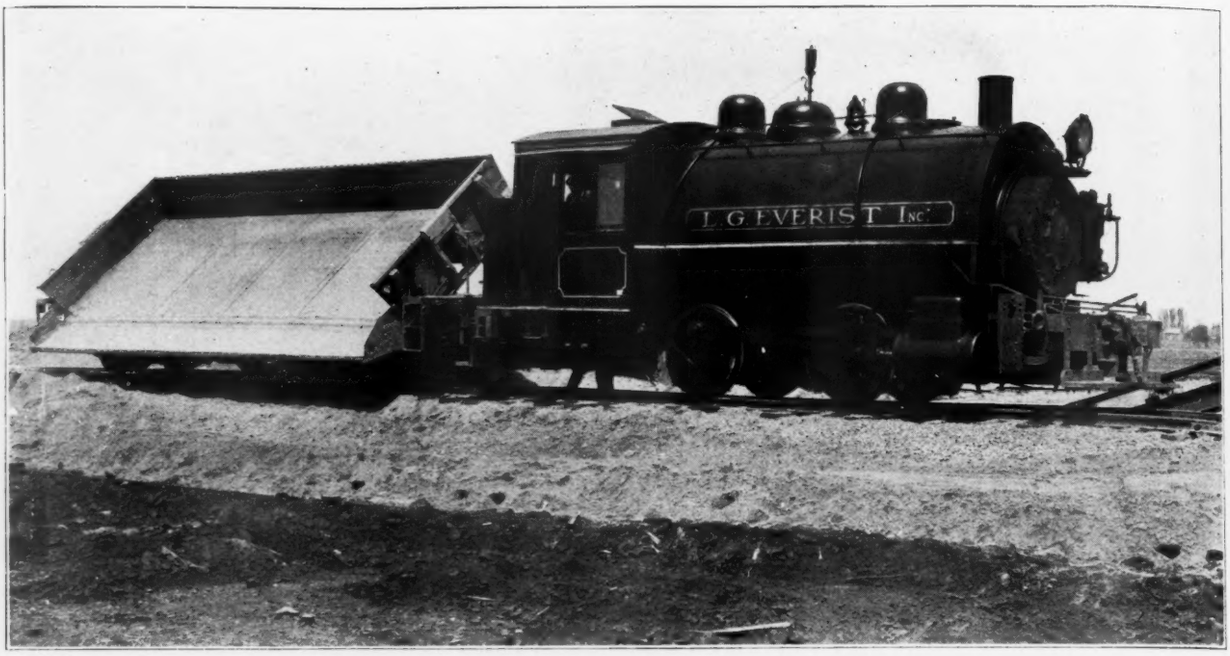
Material flows from the primary conveyor to a 12 foot by 60 inch Gates cylindrical screen with manganese sections where it is scalped to 2½ inches. The rejects pass through a Number 5 Gates, style K crusher and are taken by a 16 inch bucket elevator to the scalping screen inlet.

From the scalping screen, the product passes on to the Number 2 conveyor. It is so arranged that it takes the material to the top of the washing plant and discharges it into a sluice box. Here, it is thoroughly mixed with an eight inch stream of water to begin the washing and cleaning process. An abundance of water is supplied by a 1,500 gallon, 6 by 5 inch double suction, single stage, horizontal centrifugal pump. It is direct connected to a 100 h. p. 440 volt, Allis Chalmers, Timken bearing, slip ring a. c. motor.

From the sluice box, the material passes into an 18 foot by 60 inch Gates revolving screen. The first eight feet of this is the scrubbing section and the remainder has 1½ inch perforations. A sand jacket 84 inches in diameter and 13 feet long with 3/16 inch slotted holes removes the sand. From here it is carried to three Telsmith Number 6 sand separators where the two grades, concrete and plaster sand, are separated. From 1½ inch down, the gravel passes over two double deck vibrating screens, which make the various commercial sizes required.



General View of Dell Rapids Quarry

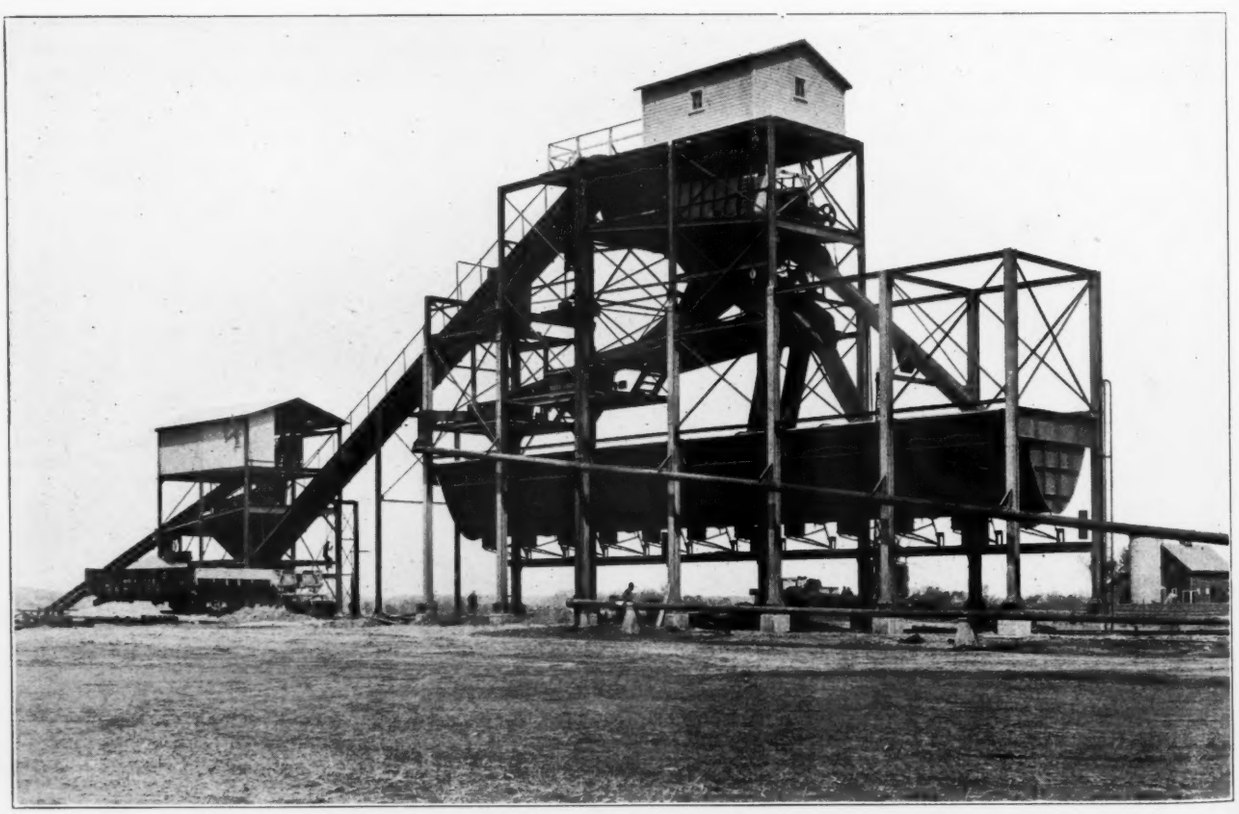


Unit at Haywarden Plant for Hauling From Dragline

As shown in an illustration, the plant is equipped with parabolic bins which have an effective storage of 60 tons each. There are two 20 by 20 inch clam shell valves at the bottom of each bin which allow a half car to be loaded at each point.

The plant is equipped with ideal railroad facilities. There are two tracks which are laid on one half of one per cent grade. One permits of center loading and the second or side loading track is carried through past the receiving hopper and joins the field track which serves the Monighan dragline. As stated this permits of loading run of the bank for road ballast and furnishes access for the American locomotive to come through on the service track and switch the plant when necessity demands.

An electric car puller is provided to place and govern cars for loading. It is operated from the loading platform and lessens switching and car moving charges.



View Showing Bin Structure at Haywarden

The Crushed Stone Plant

The Dell Rapids operations, located in the heart of the quartzite district, is 18 miles north of Sioux Falls, South Dakota. The quarry, which produces the stone, is situated on 68 acres of land directly adjoining Dell Rapids, South Dakota. For about 20 years it was operated as a quarry for building stone but, as this class of stone was superseded by the more modern building materials, the former operators decided to install a small crusher. This was used to reduce the spalls and permit the quarry to secure some of the, at that time, advancing demand for crushed stone in the building trades.

Since acquiring the Dell Rapids plant, L. G. Everist, Incorporated has rebuilt and rehabilitated the entire operation of the quarry as well as erecting a modern stone crushing and refining plant.

At present, the quarry, properly speaking, covers six acres and has a 1,500 foot working face, 25 feet in height. The holes are drilled with an Ingersoll Rand X72 drifter which replaced a well drill, formerly used.

In consequence of the stone quarrying freely, it is loaded by hand labor. Koppel 2 yard standard all steel rocker dump cars are used for transporting stone to the crushing plant. A double track, laid with 60 pound rails, facilitates the movement of cars to the incline.

Included in the crushing plant, is a ten inch McCully fine reduction crusher which is used as a primary breaker. The rejects pass to a Number 3, style D, Gates crusher and a 24 inch bucket elevator conveys the product to a 12 foot by 60 inch Gates revolving screen.

Fine sizes are passed over a vibratory screen and the tailings are returned by a combination conveyor and step chute to the Number 3 crusher. The refined material passes by gravity into the bins which are reached by both railroad and truck transportation.

The entire plant has been completely modernized in every detail as the crushing plant is operated throughout by 440 volt a. c. electric power. Allis Chalmers motors are used to drive the crusher, screens, conveyors and elevators.

Present output of the Dell Rapids plant is in excess of 600 tons per day. This consists of the various sizes required for paving and concrete construction and shipments are made in the states of Minnesota, Iowa, and Nebraska, within a radius of 300 miles.

"Geseker Natural Cement"

So-called Geseker natural cement is really a weakly sintered mixture of marl and blast furnace slag or other silicate. The designation natural cement is not justified. Haegermann (Zement, June 7, 1928).

Gasoline Consumption Increasing

The 23,127,315 motorists of the country consumed approximately 32,592,000 gallons of gasoline per day—an increase of 6.5 per cent over the per capita gasoline consumption on May of last year.

Seventh Annual Power Exposition

The Seventh National Exposition of Power and Mechanical Engineering will be held December 3rd to 8th, 1928, at the Grand Central Palace in New York City during the annual conventions of the American Society of Mechanical Engineers, and the American Society of Refrigerating Engineers. The members of these organizations come from all parts of the world to compare ideas and problems and to visualize the latest developments in Power and Mechanical Engineering achievements.

In no place in the world is there such a collection of engineering ability as is annually assembled for this meeting. Visitors to the Power Show during the past eight years have increased from a few hundred in attendance to a registered list of 25,000 and a general attendance of 100,000 for the week. The careful study given to the 500 exhibits last year proved the value of visual demonstration. The importance of the exposition is proven by the fact that of the 25,000 registered visitors, over 6,000 were officers of corporations or plant owners and sales executives, 5,000 were engineers and designers, 4,400 were technical men bent on visualizing the latest achievements. Some of the large universities include a tour of the exposition in their student courses and credit all students for such visits.

This Exposition will be the same thoroughly rounded exhibition of all manner of mechanical and engineering equipment it has been in the past. The Power Section will include displays of boilers, stokers, grates, oil burners, fans, blowers, pipe, valves, and fittings for single or central station work with instruments of precision and control.

The Heating and Ventilating exhibit this year is more clearly defined than ever and the development of many new features is expected. The problems of the heating and ventilating engineer have kept pace with progress in the kindred engineering fields.

This year the exposition will have a particularly interesting exhibit of belting and the related transmissions covering the entire field, the materials handling section with the actual demonstration of various types of industrial trucks, hoists, cranes, winches and conveyors, and the tool and machine tool section with a complete exhibit of lubricants, lubricators and equipment. Each manufacturer whose sales depend on the selections or recommendations of engineers and industrial executives can realize what such an exposition means to American Industry.

MECHANISM OF SETTING AND HARDENING OF HYDRAULIC BONDING AGENTS

Dr. Karl Biehl

ACTION of salt water (sea water) on cements is much like that of sulphates and the same phenomena are manifested in both cases. The formation of gel is not retarded. It does not appear to be impossible that the different salts of the solution (that is sea water), which is after all rather highly concentrated solution, have a mutually overlapping action.

The action of solutions of gelatine and sugar solutions on the setting process and the formation of crystals is very striking. Practical experience teaches that the time of setting is considerably drawn out and the strength of the cement is likewise greatly reduced.

Examination of the cements under the microscope does not, however, reveal the presence of either short or long needles and does not indicate the formation of calcium hydroxide. The formation of gel is very markedly retarded at least in the case of the sugar solution. The gel formation is also very slight even in the samples that are one and one-half years old, and this is due to the absence of calcium hydroxide crystals. Small rod-like and star-like structures are found in the cements and this is due to the formation of calcium saccharate. Microscopic results, therefore, agree well with practical experience, and hence show that sugar is able to destroy the setting capacity of cement almost in its entirety.

The action of the sugar on the cement takes place in the following manner, according to the opinion of the author: The lime, which is separated during the setting process, is easily soluble in the sugar solution with the formation of saccharates. Lime-containing (calcium carbonate) crystals of other sort can therefore not be formed until all of the sugar has been separated in the form of saccharate.

The sugar or rather the saccharates appear to have a marked retarding action on the coagulation of the silica gel, with the result that the formation of gel is also considerably arrested.

The solution of gelatine has a strong retarding action on the cement. Inasmuch as there is scarcely any formation of gel noticeable in the cement preparations containing gelatine solution, it appears as if the gelatine solution has been gelatinized by the action of the solution of electrolyte which is formed from the cement. Thus an impermeable shell of material is formed around the cement particles. The formation of gel, which does take place, is due in part to the coagulation of the gelatine.

The results that were obtained in carrying out a series of experiments with different chemicals and the like on molten cements, to determine the action of these substances on the setting and hardening of the cements, are given in the accompanying tabulation. The time of setting is accelerated by the action of half normal solutions of sodium hydroxide, calcium chloride, magnesium chloride, sodium sulphate and sodium carbonate. Sugar solutions and ammonium oxalate solutions retard the setting of cement.

Hydrochloric acid has a retarding action on the setting of molten cement, while it has an accelerating action on the setting of ordinary Portland cement. Furthermore, solutions of sulphuric acid, containing 0.9 per cent and 0.45 per cent of the acid, magnesium sulphate, sea water all have an accelerating action on the setting of molten cements while they have a retarding action on the setting of ordinary Portland cements.

The other sulphates that were tested also had a slight retarding action on the rate of setting of the molten cement.

The microscopic results agree quite well with similar results that were obtained in a series of experiments carried out on ordinary Portland cements. When the rate of setting of the cement is accelerated, then both crystals and gels are formed sooner.

The effects that are produced by the action of hydrochloric acid, sulphuric acid, sodium hydroxide and solutions of the chlorides of calcium and magnesium are noteworthy.

Due to its strong solvent action, hydrochloric acid dissolves the cement particles with the formation of calcium chloride. The alumina gel, which is set free in the meantime, is coagulated by means of the hydrochloric acid which has not yet been completely used up or by the calcium chloride which acts as an electrolyte. Thus the cement granules are surrounded with a white film, which resists any further solvent action to a certain degree.

Sulphuric acid, sea water and all sulphates as well, tend to cause the formation of large masses of calcium sulphate in the cement. The amount of sulphate of lime thus formed is greater than the quantity of calcium aluminate formed. It is only when the solution of sulphate is less than a certain minimum concentration that formation of calcium aluminate, after the formation of gypsum has first set in, becomes of greater significance than the latter. The formation of gel is generally retarded.

When the water that is used to make up the

TABULATION No. 1

The Influence of Solutions on the Time of Setting and the Crystallization Processes in Molten Cements.

No.	Solution	Time of Setting Hours	Action of the Solution		Condition of the Preparation after 1.5 Years
			Crystal Formation	Gel Formation	
1.	Water	3.75 to 5	Needles after 3 hrs., crystals after 15 hrs. six-sided plates	Gel forms after 2 days; strongly increased at end of third day	Crystals and gel fill entire structure. Gel agglomerates, becomes cyrstalline. Precipitation of gel increases with formation of crystals
2.	Tenth normal hydrochloric acid	4 to 4.75	White precipitate, slow formation of crystals, no needles	Accumulation of white mass. Aluminum chloride?	Many small crystals of $3CaO.Al_2O_3$, and much aqueous gel formation, not so much as in 1. Whitish coating on particles.
3.	0.9% sulphuric acid	20 min. to 3.5 hrs.	Immediate strong formation of gypsum.	Gel formation not established.	Strong formation of gypsum in well-built crystals and of granular form. Cement bacilli from cement particles, but only slightly formed. No gel.
4.	0.45% sulphuric acid.	3 to 5	Immediate strong formation of crystals.	Gel formation not established.	Besides well formed gypsum crystals, also well formed $3CaO.Al_2O_3$ crystals and water. Cement bacilli. Only slight gel formation.
5.	0.225% sulphuric acid.	4 to 5.5	After 1 hr. gypsum starts forming. Calcium aluminate crystals after 3 days.	Gel forms very much later.	As before, only with stronger formation of gel.
6.	0.11% sulphuric acid.	4 to 5.5	Gypsum forms first after 2 days and then increases. More calcium aluminate formation.	Gel forms after 7 days.	Strong crystal formation of gypsum and calcium aluminate. Almost completely gelled.
7.	n/2 sodium hydroxide.	2.5 to 3.75	Immediate calcium hydroxide formation, crystals with white coating after 5 days.	Gel formation much retarded.	Granules most covered with whitish aluminum hydroxide. Gel agglomerated. Needles and plates of calcium aluminate. Liquid congealed in semi-dry preparations.
8.	1% calcium chloride.	3.5 to 4.75	Immediate formation of needles and crystals.	Strong formation of gel after 1 day. Complete gel formation after 6 days.	Crystals formed in greater mass; many small needles. Gel agglomerated and more crystalline. Separate sphaerolithes.
9.	1% magnesium chloride.	2.75 to 4	Crystal formation much retarded.	Gel begins after 1 day.	Crystal formation quite marked; gel agglomerated. Sphaerolithes formed.
10.	1% magnesium sulphate.	3.5 to 5	Immediate formation of needles. Gypsum and calcium aluminate formation hindered.	Very slow gel formation.	Slight gel and crystal formation (alum?) Not much change. Granules with fine film of magnesium hydroxide.
11.	1% sodium sulphate.	3.5 to 4.75	Immediate formation of gypsum.	Slight gel formation after 3 days.	Clusters of crystalline needles. Cement bacilli. Large calcium aluminate cyrstals. Gel in very fine drops, not crystalline.
12.	1% aluminum sulphate.	3.75 to 5.25	Gypsum forms at once and with precipitation of aluminum hydroxide, Much retarded calcium aluminate formation.	Gel formation retarded and slight.	Gel formation stronger, many crystals also without combination with a cement particle of calcium aluminate; six-sided plates and prisms; alum cubes; cement bacilli in sphaerolithes.
13.	Saturated calcium sulphate solution.	3.75 to 5.25	Needles formed after 1 hr. Much calcium aluminate after 1 day; no gypsum formed.	Gel formed after 3 days, not particularly strong.	Much crystalline formation; calcium aluminate. Not very much gel present, partly crystalline. Gypsum very rare.
14.	1% alum.	3.75 to 5.25	Strong gypsum formation; calcium aluminate plates after 3 days.	Very sluggish gel formation; quantity much reduced.	Accumulation of six-sided prisms, large six-sided plates and rhombohedrons, calcium aluminate; isolated cement bacilli in bundles in crystals and cement particles; little gel and partly crystalline.
15.	1% sodium carbonate.	1.75 to 3	Preparations were destroyed by the formation of large amounts of calcium carbonate.		
16.	1% ammonium carbonate.	5.25 to 7	Crystal formation much retarded.	Gel formation sets in much later.	Scarcely any change, few crystals and gel. Gel agglomerates and partly crystalline. Thinner, white coating on cement particles.
17.	1% sugar solution.	15.5 to 36	Slight crystalline formation after 7 days.	No gel.	Very slight crystal formation; comparatively strong gel formation.
18.	Sea water.	0.75 to 2.5	Immediate gypsum formation.	Gel forms comparatively later.	Much contracted gel; large six-sided crystals. The formation of crystals, taken in its entirety, is limited. Gypsum crystals of good form.

cement contains sodium hydroxide, then calcium hydroxide is formed at once in the cement and the alumina gel, which is set free at the same time, deposits as a white film on the cement granules and the crystals, with the results that further progress of the solution process is very markedly retarded.

The chlorides behave in a similar manner, for the reason that they are electrolytes. They quickly and effectively precipitate the alumina, resulting in the rapid formation of gel. While in the case of calcium chloride the typical crystalline formation sets in at once, magnesium chloride on the other hand has a retarding action on the formation of the crystalline structure at the beginning.

Sodium carbonate has a marked destructive action on the cement, which is due to the formation of calcium carbonate.

The sulphates are moreover interesting because of the fact that cement bacilli is often found in the preparations of molten cement.

The experiments carried out with the organic salt, ammonium oxalate and sugar showed, especially in the latter case, a marked retardation of the rate of setting of the cement and corresponding thereto a marked reduction of the formation of crystals and gel. According to the author's opinion, the reasons for this are similar to those in the case of ordinary Portland cement, namely, the formation of easily soluble calcium saccharate. The flocculation of the alumina gel is very markedly retarded by the presence of sugar the same as in the case of the silica gel.

Hence the following summary may be made of all the observations which have been discussed here. The processes, which take place in the cement and which are typical for the setting of the cement, are in liquid preparations as follows:

An earlier or later occurring formation of crystals, together with the very closely related and somewhat later manifested formation of gel.

As far as the action of other liquids besides water on cements is concerned, this process is affected in such a manner that the formation of crystals or of gel is either accelerated or retarded. The influence of the solutions on the coagulation of the gels appears to be of particular significanee. If the solution has a chemical action on the lime (carbonate of lime) which is split off the cement particles in all cases, then formation of different kinds of crystals first takes place, which are dependent on the character of solution used. Hence in almost all cases the formation of crystals and gel, which is typical for the cement, can again be observed.

The fact that marked formation of crystals is of considerable importance in the setting and hardening process can be directly deducted, in the writer's opinion, from the behaviour of the cements with solutions of sodium carbonate and sugar.

The crystallization process plays a very minor role both in the case of ordinary Portland cement as well as in that of molten cement when they are subjected to the action of sugar. On the other hand the formation of gel is constant, although it takes quite some time for the first traces to appear. This circumstance affords an explanation of the fact that the cement samples which are made up with a solution of sugar do not harden at the beginning due to the non-appearance of crystals, but after some time has elapsed the cement samples always attain a certain strength.

When the cement is made up with a solution of sodium carbonate, immediate formation of crystals always takes place and hence the cement rapidly sets. According to the writer's belief, this is due only to the formation of sodium carbonate, which takes place in a marked degree at the beginning. The action of the sodium carbonate is also considerably strengthened by the formation of sodium hydroxide.

When the cement sets rapidly, it has always been observed in practical work that the strength of the cement both in tension and in compression is not very high and moreover that the after-hardening effect does not reach the stage attained by the same cement, which has been given normal setting properties, for example by the addition of calcium sulphate.

The phenomenon, that the cements may be so markedly disturbed during the setting process by shaking, stirring and the like, that they cannot later attain any appreciable strength, is well-known to all. Is it not possible that the crystalline structure, which is formed during the setting process, is destroyed and the gel, which separates out as a result thereof, surrounds the cement granules and retards further solution and crystallization processes?

Operation of Automatic Shaft Kilns

The carbon dioxide of the raw slip and the compressed fuel react at about 500-600 degrees C., but nevertheless this reaction does not assume an outstanding importance for the combustion of compressed fuels in automatic shaft kilns. This combustion follows essentially the non-uniform influence of atmospheric air upon the fuel in a temperature range which is far above the dissociation temperature of calcium carbonate. The speed of combustion of the compressed fuel is dependent primarily upon the prevailing temperature rather than upon the grain size of the fuel. The diffusion process in the interior of the heated raw stone appears to be so vigorous that the size of the raw stone grains is not of decisive importance so far as the speed of burning is concerned. Hans Kuhl (Zement, June 7, 1928).

WAUKESHA SAND AND GRAVEL COMPANY COMPLETES NEW PLANT IN WISCONSIN

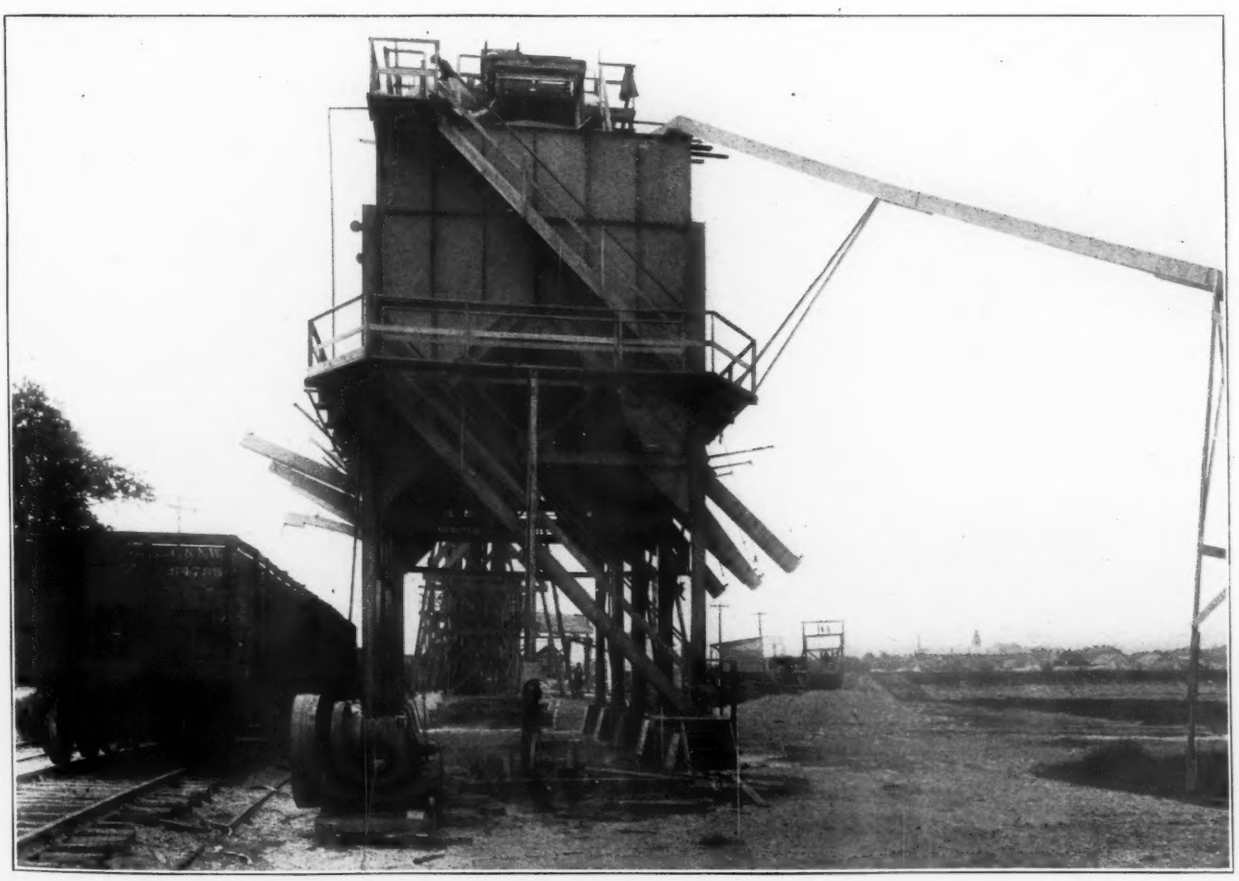
By E. D. Roberts

AT THE end of the last operating season, the Waukesha Washed Sand and Gravel Company found that they had removed practically all of the suitable material from their pit in South Waukesha. They had anticipated this situation, however, and had procured a tract of 62½ acres about a half mile further south at the edge of the city and on the main line of the Soo Railroad.

When the time arrived for moving the old plant to the new site it was found that the wooden bins had settled out of shape, cracking and crushing the timbers to such an extent that it was impossible to transfer it to the new site. In this same city, the Butler Bin Company manufactures stationary and portable unit type bins. The officials of the Waukesha Washed Sand and Gravel Company were interested in the new type Butler unit bin but had an idea of their own which the Butler Bin Company agreed to incorporate. The illustrations of the bins show how the Butler Bin Company incorporated this idea in the sharp angle from the bottom underneath and towards the center. The theory involved is that the material will discharge more rapidly from these bins in loading because of this slope.

The site for this new plant is a high level bench which was formerly the bed of a prehistoric lake through which the Fox River has cut its valley about a half mile to the west, leaving the gravel high and dry. This deposit was laid down during the retreat of the glacier which formerly covered Wisconsin. The glacier had brought the gravel and rock from up in Canada to drop it as soon as the ice melted giving various deposits depending upon the conditions obtaining at the terminus of the glacier, in this instance producing a bed of gravel with a large amount of pebbles.

A Koehring gasoline shovel with truck haulage removes the top covering of soil to a depth of 2½ feet exposing clean gravel, of which 35 per cent is sand and 65 per cent pebbles. Two 1½ yard Sauerman dragline scrapers excavate the gravel from the virgin bank and haul it to a hopper placed at the intersection of the haulage cables. The buckets are operated by independent Thomas hoists, one a single drum and the other a double drum unit with a direct connected electric motor furnishing the power to each hoist. This method of excavation gives continuous operation



End View of Screening, Washing and Storage Unit

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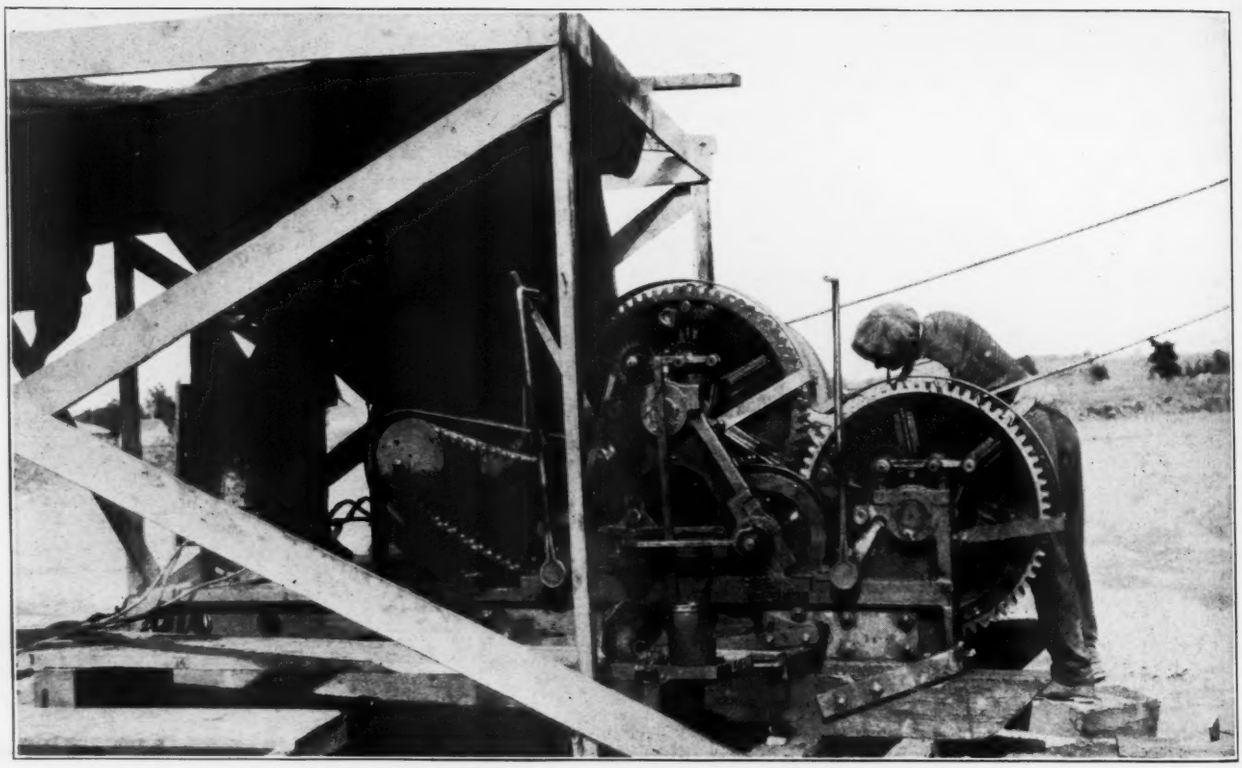
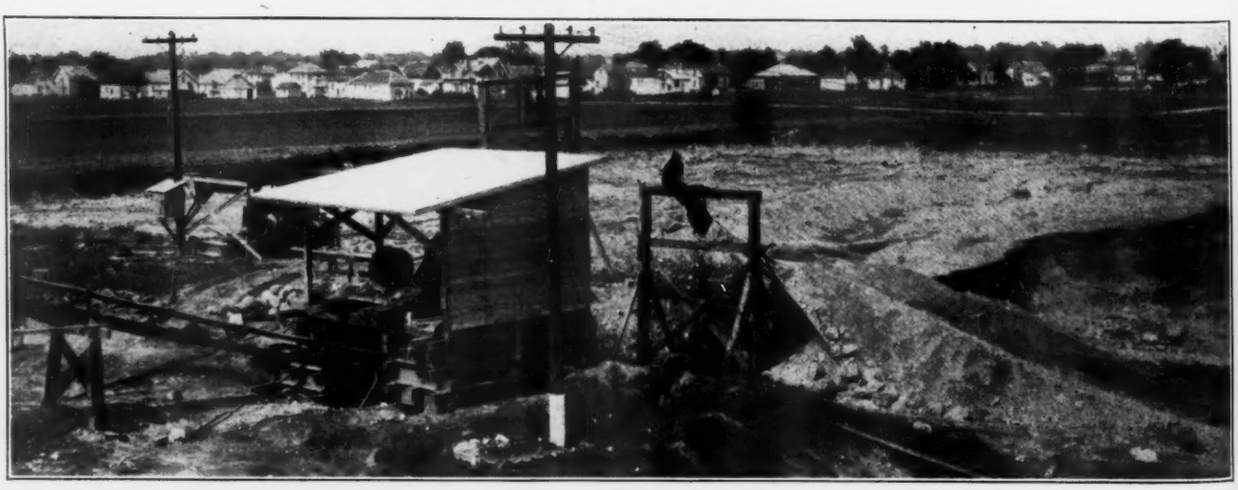
General View of Plant



Close-Up of the Double Drum Hoist



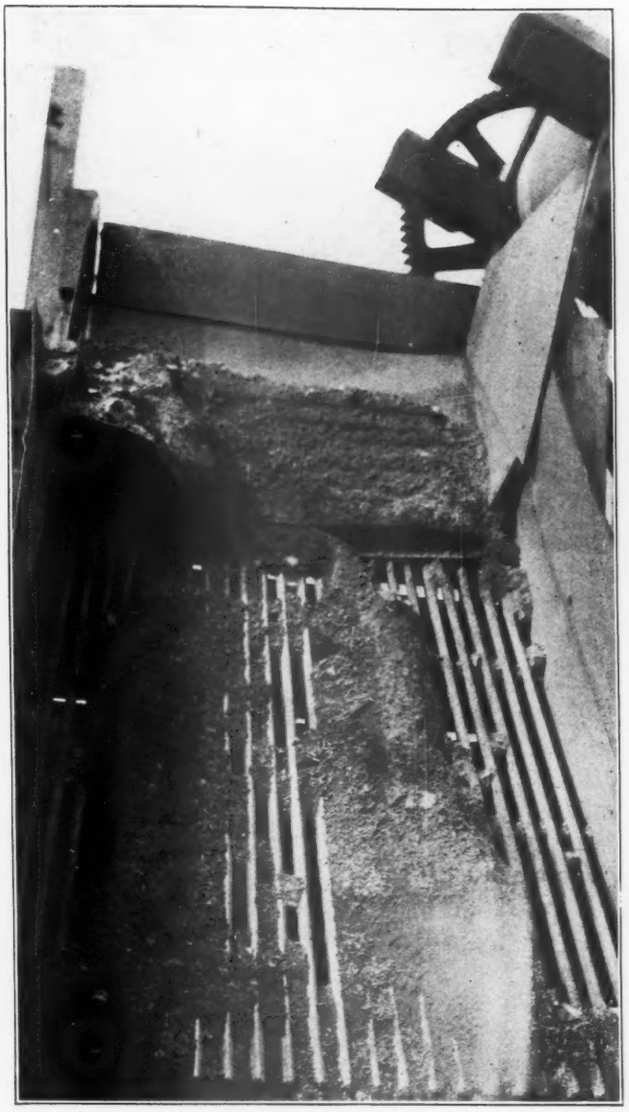
View Showing Both Hoists and the Field Hopper

of the plant thus insuring increased production.

An automatic plate feeder draws the raw sand and gravel from the field hopper and feeds it to a 24 inch conveyor belt which transports it to the initial scalper consisting of an inclined grizzly with three inch openings. The material passing through the bars of the grizzly falls through a chute to another 24 inch number 2 conveyor belt while the larger stones rejected by the grizzly fall into a Telsmith crusher for preliminary breaking. This crusher discharges onto the same conveyor belt that receives the material passing through the grizzly. The number 2 conveyor carries the material up another incline and discharges it into the scalping screen, a rotary screen rejecting stone above two inches in size and discharging it into a second crusher while the fine material falls through a chute to a number 3 belt, which also receives the discharge from the number 2 crusher.

The number 3 belt carries the mixed sand, gravel and crushed rock to the top of the bins and discharges it into a dividing box into which a stream of water is directed, causing the material to flow into either or both of the twin set of conical screens provided for the final sizing of the aggregates. A stream of water is jetted into each of the screens to further wash the material and force it on into the next screen, in each instance the material rejected by the screen falling into a directing chute for routing to the proper bin below. The sand passes on into a Good Roads dewaterer consisting of a set of paddles which draw the sand up an incline out of the water. An overflow opening leads the wash water through a flume to a settling basin. A very small amount of soil has to be removed but, as Mr. Buttke, the superintendent, stated "you can't do too much to perfect your product in these days when marketing sand and gravel in the Milwaukee District."

There are four large bin compartments with a total capacity of 900 tons. Unlike the usual type of unit bin, these bins slope from the center outward, requiring less height for side dumping and allowing a final wash of the coarse aggregate as it is chuted from the bin into the cars or trucks. There are 8 quadrant type gates on each side of the bins, one set loading the cars on the west and the other set loading trucks along the east side of the bins.



Close-Up of Grizzly

The Grizzly and First Belt Conveyor

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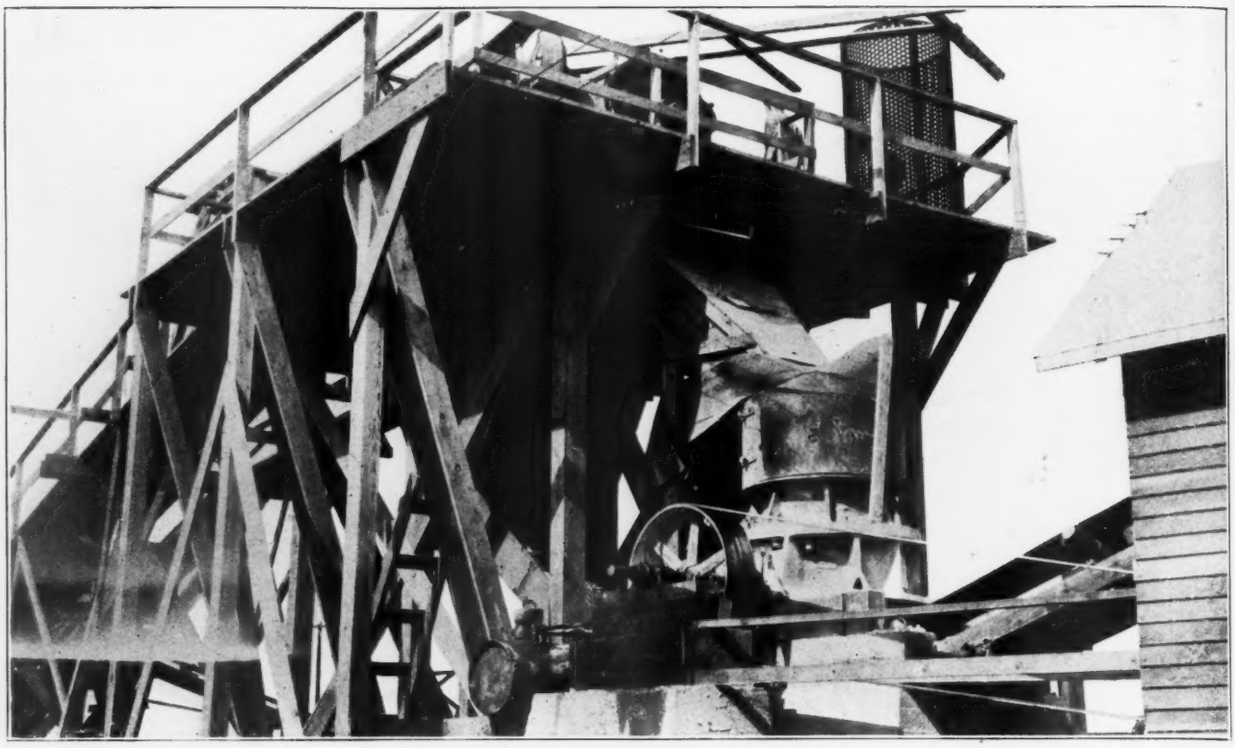


Primary Crushing Plant

Close-Up of Storage Bin for Milwaukee Business

Another set of 8 quadrant type gates has been placed underneath the bins where the slopes meet. These gates will feed the sand or gravel to a belt to be installed for handling the excess material to storage. At present a Brownhoist locomotive crane is building up a storage pile along the track to the south. The water for washing and plant operation is furnished by two 6 inch American Well Works centrifugal pumps. The plant motors are of Westinghouse and Allis Chalmers manufacture, all of 440 volts and 60 cycles.

The City of Waukesha will not allow contractors to use sand and gravel directly from the plant so a portable 60 ton Butler bin is provided in the storage yard. A Thew crane handles the sand into the sand compartment and the coarse aggregate into the other compartment directly from the stock piles. This bin is fitted with the latest in control apparatus for governing the proportioning of concrete aggregates. An adjustable measuring hopper is provided under the coarse aggregate while a weighing hopper insures a constant volume of sand. All of the scale parts are of steel so that the usual trouble experienced with castings in moving is eliminated. A "spanker," to cause the damp sand to flow from the hopper into the weighing hopper, adds to the efficiency of the bin.

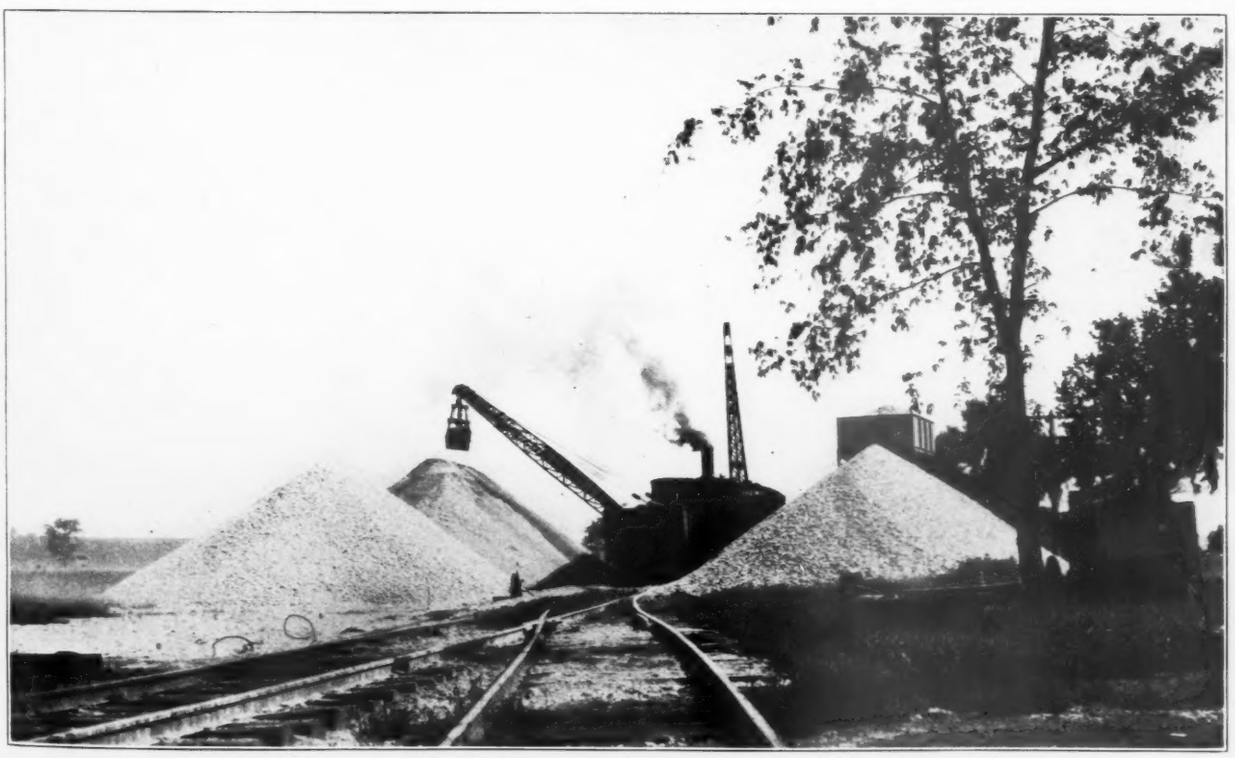
Al Heiser and Ed Landsinger constructed the plant and assisted in its design under the direction of W. P. Buttke, superintendent. They have a plant of which they can well be proud. The strong steel column, resting on large concrete pedestals, with their connecting girders forming the sides of the bins provide a rigid support for the machinery carried on the steel superstructure. And, when the present site is worked out, the bins, as well as the machinery, can be moved to a new site where they will serve as efficiently as when new.

There is another asset to a company having a substantial plant of this kind—the psychological effect on the customer who is planning a large paving campaign and wants an uninterrupted flow of clean properly graded gravel. An inspection of the plant will convince him that he need have no fear of shut downs due to shafting getting out of line when the wooden bin settles or, as has happened to a new bin this spring, to collapse, shutting off production until a new bin can be erected and the machinery replaced.

The Waukesha Washed Sand and Gravel Company operates several sand and gravel pits in the Milwaukee District. Mr. George Brew is president and general manager of the company; Miss Prudence Nolan is the secretary and treasurer in charge of the main office, which occupies a suite in the Loan and Trust Building, Milwaukee, Wisconsin.

Moldable Oxychloride Compositions

Raw or calcined magnesite is heated with a fluxing material such as Na silicate or borax and the clinkered product thus formed is mixed with a solution of $MgCl_2$. $AlCl_3$ and $BaCl_2$ may be added, as may also waterproofing substances such as resin soap, Al, Zn, Mg or other insoluble stearates or greasy or fatty substances and fibrous or other fillers. Wall tiles, table tops, floorings, wash basins or other articles may be formed from the mixtures. R. H. Abrey. (British Patent 273,989.)



View of the Outside Storage System

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ADMINISTRATIVE CONTROL BY GRAPHIC CHARTS

By J. J. Berliner

ADMINISTRATIVE Graphic Control Charts provide a means by which the business exexuctive, laying no claim to expert financial knowledge, may read from his Balance Sheet and Income, Profit and Loss Statement more vital facts of his business than he has customarily been able to find in his reports.

These charts enable one to grasp conditions immediately and comprehensively, and without great mental effort, as they visualize in definite form the activities and trends of the various phases of the business. The contents of a Balance Sheet or Income Statement may be interesting in themselves, but mean little until relationships are completed and portrayed.

The amounts of inventory, plant investment or current liabilities, as shown on the ordinary balance sheet, express a monetary value, but their real value is fully understood only when their relation to is measured together with the turnover of inventories, the turnover plant investment, and the relationships.

The financial and operating statistics of a business contain the most intimately related facts, and their greatest value lies in the establishment of these relationships. By them a complete analysis is developed, which gives a thorough knowledge for directing and controlling the operation of a business.

A comprehensive set of charts which will bring out all of the administrative factors of a business as directly under the eye in a form which will prove most valuable to the busy executive.

The following are a series of charts, visualizing and facilitating administrative control:

Relation of current assets to current liabilities, showing degree of liquidity and working capital ratio.

Relation of cash to current liabilities, showing cash position.

Relation of accounts receivable to sales, showing collection policy.

Relation of sales to finished goods, showing finished goods inventory turnover.

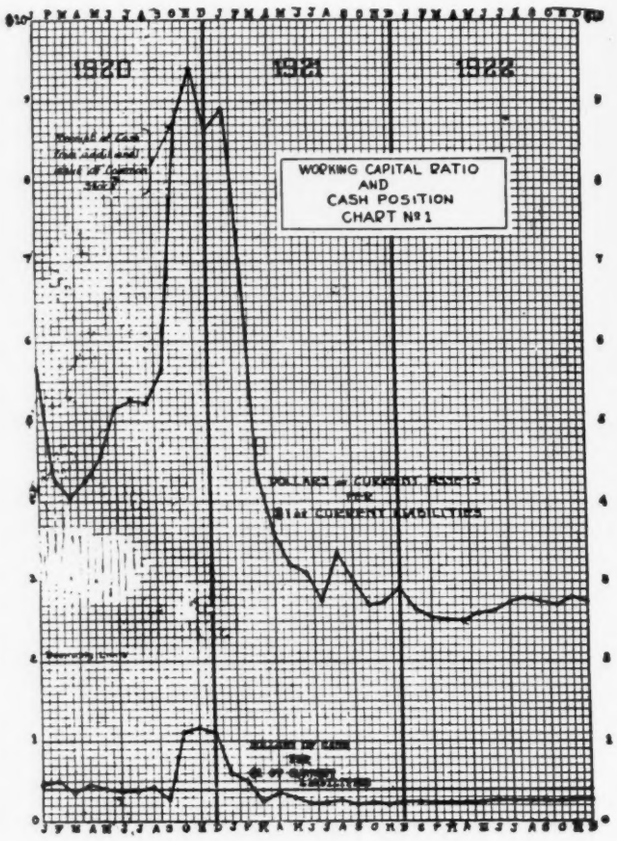
Relation of sales to materials and supplies, showing condition of inventory.

Relation of sales to total inventory, showing total inventory investment turnover.

Relation of sales to property and plant, showing turnover of plant investments.

Relation of fixed liabilities to surplus, showing balance between capital accumulated and capital secured by loan.

Relation of reserves to total assets, showing degree of conservatism.

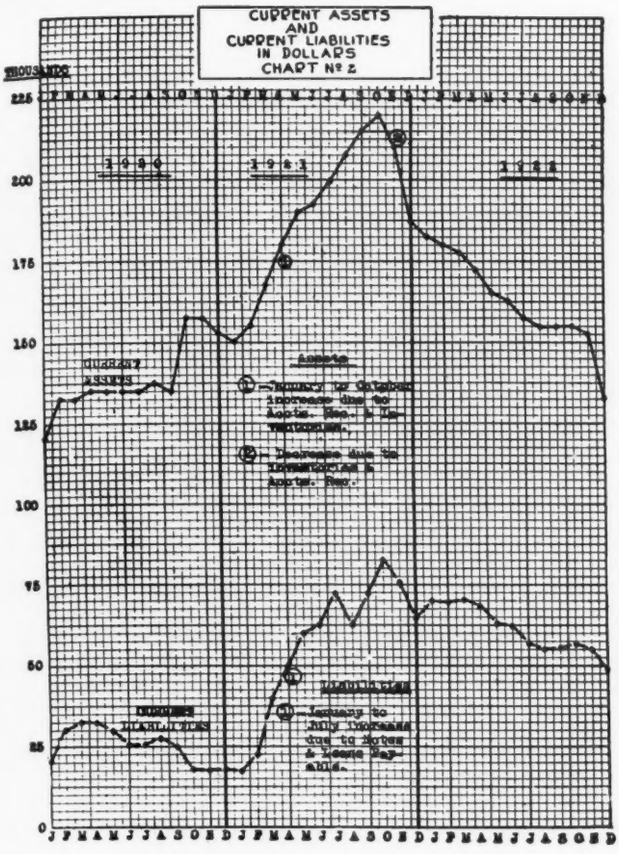


Relation of profit and loss to net worth or capitalization, showing degree of earning power.

Liquidity and Working Capital Ratio

The working capital ratio, or relation of current assets to current liabilities, is probably the most commonly known measure applied to financial statements and is most frequently noted in studying a business with a view to extending credit. The maintenance of adequate working capital in a business and a good working capital ratio are of the greatest importance. Lack of sufficient working capital might hinder operations and create an unfavorable credit position. The ratio indicates the ability to liquidate under pressure of a crisis.

It is important to know exactly this relationship, but the mind should not be burdened with retaining these figures from month to month. A chart will show these relationships monthly for an indefinite period, while without such chart additional mental effort is necessary to get the true value of these elements. A chart shows precisely what the condition is at the close of any period, thereby converting these items in the balance sheet from mere figures to business facts from which deductions as to future conditions may readily be made.


CURRENT ASSETS AND CURRENT LIABILITIES IN DOLLARS CHART Nº 2
THOUSANDS
1924
1923
1922
CURRENT ASSETS
Assets
① —January to October increase due to Accts. Rec. & Merchandise.
② —Decrease due to Inventories & Accts. Rec.
CURRENT LIABILITIES
Liabilities
① —January to July increase due to Notes & Accts Payable.

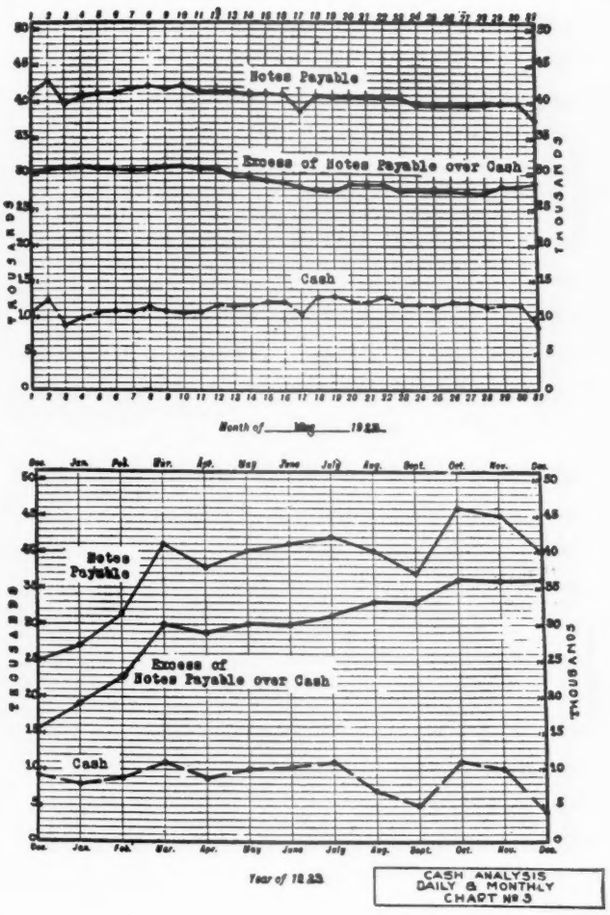


Chart No. 2, for example, shows that the current liabilities between January and October, 1921, increased in approximately the same amount (of $70,000 and $65,000 respectively). If presented by figures alone, they would tend to convey the impression that this would constitute no marked change in the condition of the business. Chart No. 1 shows clearly, however, that the increases, though in approximately the same amounts, were by no means in the same proportion; and that, while in January, 1921, there were $8.90 current assets to every dollar of current liabilities, in October there were but $2.70 of current assets to every dollar of current liabilities.

It also clearly shows that expansion of current assets and current liabilities as shown in 1921 on chart No. 2 on the same capital, means a lower ratio of current assets to current liabilities, and inversely on contraction of these elements.

Figures alone are apt to be deceiving and only a considerable training in accounting and finance will enable one to analyze fully the significance of what has taken place during a period, while charts reflect this automatically and instantaneously.

Cash Position

Chart No. 1 shows that cash played no important part in the proportional variation of current assets and current liabilities until October, 1920, and then only as a result of the receipt of additional capital. Ordinarily, cash, as reflected on the chart, is not sufficient to vary the trend of the curve showing $1 of current assets per $1 of current liabilities, but nevertheless it is one of the most important of the current assets.

Cash was included on Chart No. 1 because it is the most active of the current assets and should be measured with and by current liabilities. The monetary value represented by cash is not really appreciated until consideration is given the current liabilities which must be liquidated with cash.

In this instance, the desirable limit was 40 cents of cash per $1 of current liabilities. In other words, it was considered unfavorable if the current liabilities were more than 2½ times the cash on hand.

As a result of the increase in current liabilities between March, 1921, and December, 1922, shown on chart No. 2, the cash on hand represented a smaller proportion than the limit established during this period.

Another analysis of the cash situation is shown on chart No. 3, where notes payable, cash and the net balance are shown both daily and monthly.

Sufficient supply of cash is the first requisite of a business, and such charts will show exactly the relative value of cash and its relation to current liabilities. They enable the executive to keep before him continuously, exactly what the cash is in

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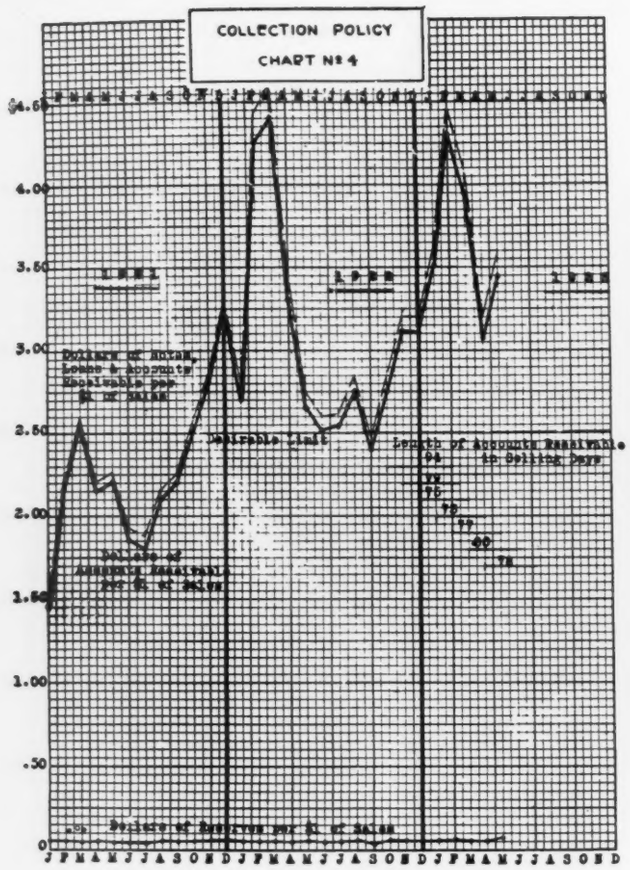


dollars as compared with outstanding current notes payable and the excess of notes payable over cash.

The upper black line represents the notes payable in dollars, the middle black line represents excess of notes payable over cash, and the broken line represents cash on hand. If every dollar of cash on hand were used to liquidate the outstanding notes payable, the balance still unpaid would be represented by the middle line.

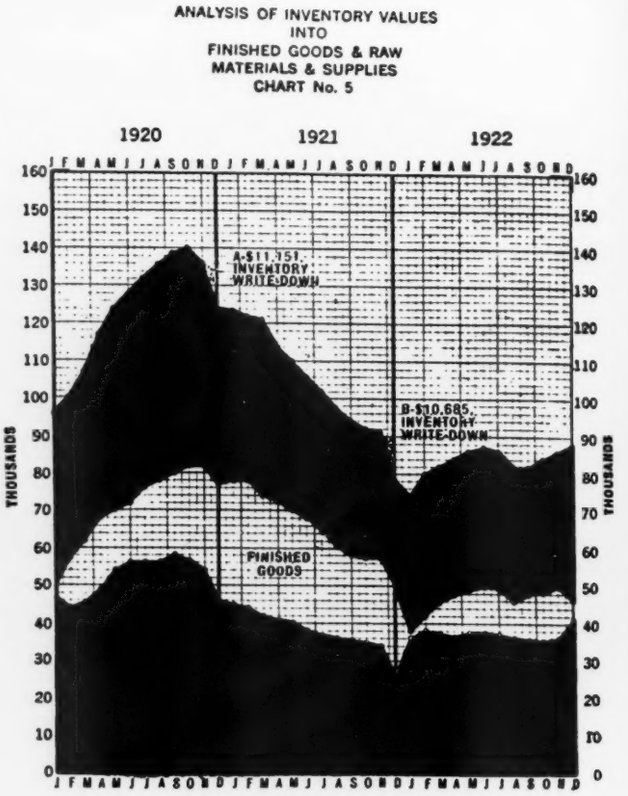
Collection Policy

Accounts receivable virtually represent the uncollected sales values the customer is using without any charge and which frequently has to be replaced by borrowed capital for which interest is paid, thereby reducing the margin of profit from these sales.

Therefore, they become a very important factor which should constantly be under observation.

Accounts Receivable analysis gives the collection manager a close and intelligent knowledge of his account. The turnover of accounts receivable is most effectively stated in the number of average days' sales represented in outstanding accounts receivable. An increase in the turnover of accounts receivable results in added net profits on the original investment.

Since accounts receivable are a direct result of sales, it is necessary that they be measured by them, and in order to show their true condition to



the executive clearly and concisely, they must be presented in a simplified form.

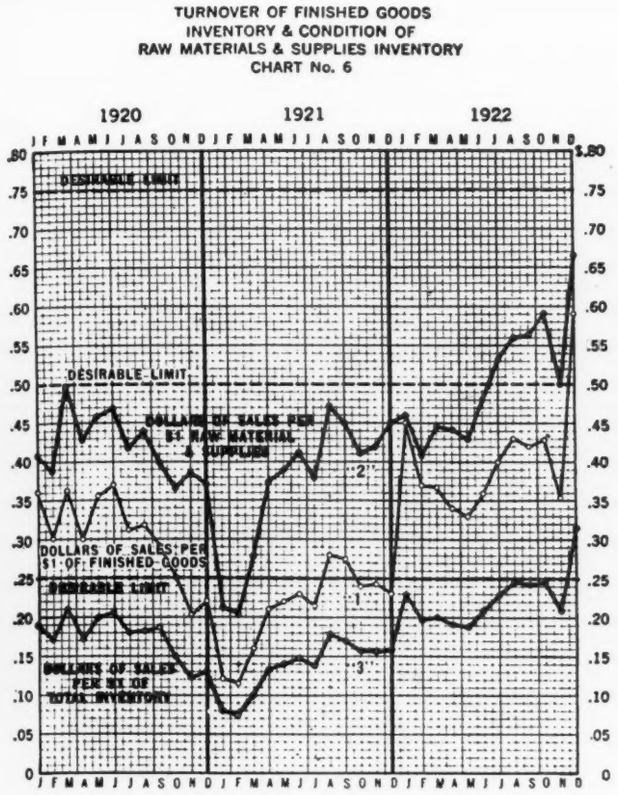
For the purpose of illustration, there are included on chart No. 4 the notes and loans receivable. These notes and loans represent old accounts receivable for which notes have been given and a small amount of loans made to some of these customers in order to help them over a difficult period.

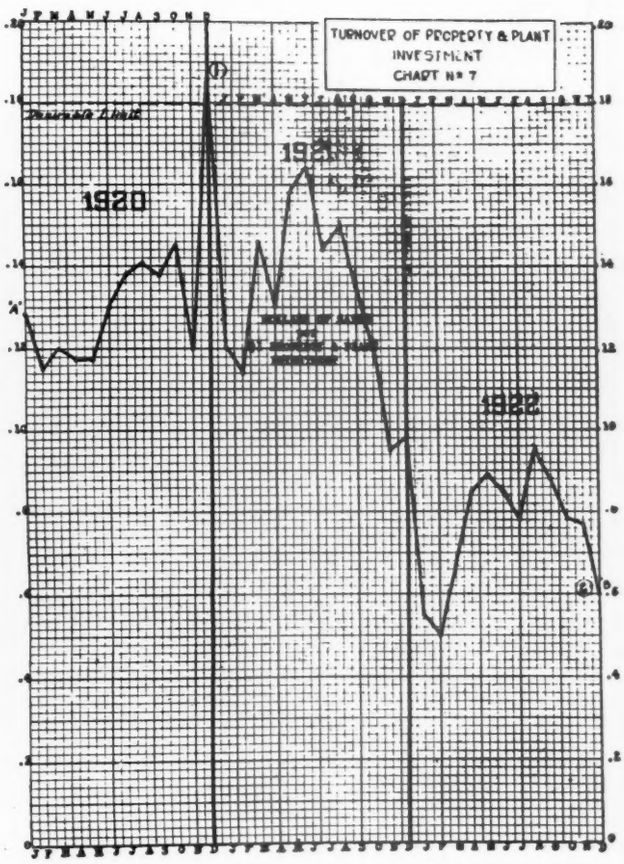
They originated several years back and have been carried ever since, and really should have been written off as Bad Debts. But, for the purpose of making a good financial showing, they were included. However, when the executive saw his accounts receivable visualized, he immediately investigated and had them written off 50 per cent. Another interesting revelation was that the Reserve for Bad Debts was set up at 5 cents on every dollar of sales regardless of the age of the accounts receivable.

The last year on Chart No. 4 shows that accounts receivable have not once been less than $3 to $1 of sales. This means that for $3 of sales the best that could be done was to collect $1 within the credit period allowed, and in one instance, February, there was $4.25 outstanding for every $1 of sales.

Converting these figures into selling days, shows that they have ranged from 78 to 94 days; or, in other words, sales made in April would not be paid for until the middle of July at the current rate of collections.

For the purpose of overcoming mental effort and endless detail, chart No. 4 was constructed. It





shows the proportion of sales uncollected, the length of accounts receivable in selling days, the proportion of old accounts that have been converted into notes and loans, as well as the proportion set aside as bad debts and uncollectable, thus giving a complete history of the accounts receivable in a simple and complete form.

This chart enables the executive, with his knowledge of the business, to forecast probable collections with considerable accuracy; it shows the sales and collections and automatically sets the pace for the latter.

Finished Goods and Total Inventory

During the fiscal year or any given period of business, two things are disposed of or turned over: (1) Stocks of materials, (2) money invested in inventory.

The rate at which these two elements move has a very definite effect on the profits; and an efficient control will go far towards securing maximum profits with a given capital, or a given profit with a minimum capital.

No matter how fast goods move or how rapidly the investment in finished goods is replaced, if an elaborate investment is required in order to produce the stock or merchandise investment, the turnover of capital necessary to replace it would be slow and the business might be made more successful from the standpoint of profits.

In the final analysis, the turnover is not an end in itself, but merely a means to an end—namely, net profit—for the more rapidly the investment in inventories is turned over, the smaller the amount of capital required to finance a given volume of business.

On chart No. 5 are shown the values of Raw Materials and Supplies, Finished Goods and Total Inventories as compared with sales in dollar values. It shows immediately the inventories as compared with sales.

The money tied up in excess inventory may be readily compared with that of accounts receivable, for each represents "current assets" which are not "working" and which may depreciate through market depression or business failures.

Property and Plant Investment

The proportionate value of sales to property and plant investment expresses the relationship of the volume of business to the capital invested in property and plant.

In most instances a large majority of fixed assets represent means of production and are therefore directly related to sales. This relation measures the economic necessity of the assets.

Monetary values of property and plant carried on the books represent their established value, whether derived from periodic depreciation applied to them or from appraisals, or both, and they mean very little outside of the investment represented, unless other factors are taken into consideration.

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By measuring property and plant investment by sales, consideration is given the value of these investments, as overvaluation is reflected in costs and is a financial burden.

A conservative investment in property and plant creates a burden of overhead expense which is a permanent competitive disadvantage to a business. Such a situation is remedied by:

1. Reduction of property and plant.
2. Increased volume of business.

Chart No. 7 exhibits the ratio of sales to property and plant investment of a concern by line "A-B," showing but 12.8c sales in January, 1920, to $1 of property and plant investment, rising to 18.5c (1) in December, 1920, and dropping to 6c (2) in December, 1922, for every dollar of property and plant investment.

The rate of turnover set as a desirable limit for any one period must not be adopted as a standard for all times. Competitive conditions, the character of the business, etc., should regulate the rate of turnover.

Chart No. 7 gives an instantaneous and invaluable interpretation of the figure shown on the balance sheet and income statement in a way that induces more accurate conclusions and management. An executive need only investigate when the proportion is below the desirable limit, when he realizes that the excess of property and plant investment is eating up the earnings and jeopardizing future profits.

The executive does not have to wait for the auditor's report to know that the sales are not keeping pace with the plant investment. He quickly realizes the situation when the curve continues below the desirable limit.

More Potash Struck in Texas

Another substantial find of potash was recently made public by the Interior Department. The Geological Survey has recently completed its analyses of cores received from four test wells drilled by the Bureau of Mines under the potash act, which provides for joint explorations by the Departments of the Interior and Commerce. In the interval between the depths of 1,935 feet 7 inches and 1,945 feet in well Number 4, drilled in southwestern Ector County, Texas, are two potash beds that have a combined thickness of 6 feet 7 inches and together contain 12.86 per cent of K_2O, equivalent to 18.98 per cent in the soluble salts. It was churn drilled to the top of the salts at 930 feet and core drilled to a total depth of 2,098 feet.

The fifth well was drilled on the Harris Brothers' ranch in block HH, in the Northwest ¼ section 16 of the Gulf, Colorado and Santa Fe Railway survey, Crockett County, about 25 miles south of Rankin. A churn drill was used to a depth of 1,161 feet and was completed with a core drill to the total depth of 1,799 feet. The core furnished much data of scientific interest bearing on the relations of polyhalite with other minerals, particularly halite and anhydrite, and disclosed a considerable body of low grade polyhalite, but no beds of commercial value. The highest analysis, 13.52 per cent of K_2O in the sample was obtained from a 1 foot bed at a depth of 1,682 feet. At 1,370 feet 6 inches there is 6 feet 6 inches of polyhalite and other salts containing 5.10 per cent of K_2O. If a 10-inch layer of salt and anhydrite at a depth of 1,375 feet 2 inches is excluded, the remaining 5 feet 8 inches of salts contains 5.84 per cent of K_2O.

The sixth well was drilled in Burleson-Sun lease, in section 100, three miles north of McCamey, in southwestern Upton County. A churn drill was used to 437 feet, and the well was completed to 1,501 feet with a core drill. The richest bed penetrated, which lay at a depth of 1,167 feet 7 inches, contained only 10 per cent of K_2O and was only 1 foot 8 inches thick. At a depth of 632 feet 4 inches a 2 foot 3 inch bed of medium grade polyhalite contained 8.24 per cent of K_2O in the sample. A 1 foot 11 inch bed at a depth of 901 feet 7 inches contained 9.22 per cent of K_2O and another 1 foot 11 inch bed at a depth of 1,213 feet 3 inches contained 8.87 per cent of K_2O in the sample.

The seventh well was drilled on the Hughes Roxana lease in section 4, William Teer survey, Upton County. The top of the salts was reached by churn drill at 445 feet and was completed to 1,230 feet by core drill.

The 1 foot 3 inches of core at a depth of 691 feet 3 inches is largely glauberite and small amounts of glauberite, both red and colorless, appear at other depths.

In addition to the study of potash-bearing cores, the Geological Survey is continuing its examination and analysis of cuttings from wells drilled for oil in potential potash territory, because information from such sources is needed to extend knowledge of the potash fields and serves as a basis for the further selection of sites for core drilling.

Determination of Manganese in Lime

Treat 1 g. material with 20 cc. HCL and evaporate to dryness. Take up with 10 cc. HNO_3, sp. gr. 1.20, and a little H_2SO_4 and evaporate till SO_3 fumes are produced to remove Cl. Cool, add 30 cc. H_2O and 5 cc. of 1:1 HNO_3 and transfer to a conical flask. Add 10 cc. 0.01 $NAgNO_3$ and 20 cc. satd. $(NH_4)_2S_2O_4$ and raise to boiling in 10 minutes. Cool and just decolorize with $FeSO_4$ solution. Add 10 cc. more $(NH_4)_2S_2O_4$ and heat to boiling, cool and finally titrate with standard As_2O_3. This method does not work for more than 1% MnO. E. Pujol. Rev. materiaux construction trav. publics No. 220, 7-8, 1928. (C. A.)

NEW FELDSPAR MILLS OF GOLDING SONS READY FOR OPERATION

GOLDING SONS COMPANY operate feldspar mills located at Erwin, Tennessee, East Liverpool, Ohio, and have two new mills ready for operation at Spruce Pine, North Carolina, and Trenton, New Jersey.

The new plant at Spruce Pine has a capacity of 100 tons per day and has been designed somewhat differently than the new Trenton mill. The location at Spruce Pine was chosen because of its close proximity to the source of raw materials. At Spruce Pine the material is taken from crude storage bins to crushers, then to Hardinge mills and then over Magnetic separators to screens. The fines go direct to cars or to air separators. The tailings are returned to the Hardinge mills. The tailings also from the air separators are returned to the Hardinge mills. The material from the air separators is delivered either to cars or storage.

The Trenton mill has just been placed in operation. Figure one shows the raw material side of the Trenton plant—that is to say, where the raw material is taken into the plant, and figure two shows the finished storage bins where the material is discharged into trucks or into railroad cars and shipped to the customer.

There are many new and novel features connected with this new Trenton mill. You will note in looking at illustration number one, that there are two or three box cars standing parallel to the plant. This portion of the mill is provided with four big storage bins for storing crude material. Each one of these has a capacity of 300 tons. You will note that there are four bins now. Provisions have been made for adding two more.

At the extreme left of the raw material bins is located a large jaw primary crusher that reduces the feldspar down to approximately two inch pieces. From the crusher the material is elevated in a bucket elevator to the top of the raw storage bins and is discharged onto a horizontal belt conveyor that is provided with a tripper which can be located to discharge the crushed rock into any one of the four bins.

Underneath the storage bins there are located two traveling Schaffer poidometers. These poidometers can be operated singly or in tandem. Inasmuch as they are movable, it means that one can be located under number 1 bin and the other under 2, 3 or 4 bin — or both under the same bin. To illustrate further, if it is desired to grind Maine spar, which is stored in number 1 bin, the poidometer is set so as to deliver a predetermined amount of spar uniformly onto a belt conveyor that discharges into a secondary crusher. If for any reason it should become desirable to ship a blended spar—say 60 per cent Maine spar and 40 per cent North Carolina spar, one poidometer is set under the bin containing Maine spar, regulated to deliver a uniform amount in the proportion of 60 per cent Maine spar, and the second poidometer should be placed underneath the bin containing North Carolina spar, regulated to deliver a uniform quantity amounting to 40 per cent of a blend of Maine and North Carolina spar.

The poidometers are electrically operated and are provided with electrical cut-outs, which means that if either one or the other should fail to function they both stop immediately, thus precluding absolutely any error in blending.

From the secondary crusher, which reduces the spar to ½ inch and smaller, the material is ele-

Figure Number Two

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Figure Number One

vated to a dryer, and after the crushed material leaves the dryer is elevated to a vertical gravity dryer. From the dryer the material is passed over a Dings magnetic separator and then discharged into a large wooden feed bin. After the material leaves the dryer it does not again come in contact with iron.

From the wooden feed bin the material is passed through the latest type of Hardinge air swept mill, which has a capacity of two tons per hour when grinding the material to 200 mesh. After the material is ground at the Hardinge mill it is passed to an intermediate storage bin, where the material is sampled and held until after the tests are completed and found to be O. K. in every respect. Then it is passed to the large circular finished storage bin, from which bins the material can be loaded into trucks or railroad cars. Every provision has been made to insure uniformly prepared material. Additional grinding units are being installed to permit the grinding of Cornwall stone and flint.

Commends Republican Good Roads Plank

Commendation of the Republican party's plank on good roads, included in its pledge of principles at Kansas City, was voiced in Washington recently by J. Borton Weeks, President of the American Motorists' Association.

"The party, however, in pledging continuation of the $75,000,000 annual Federal-aid appropriation, does not go far enough, in that this sum is not a sufficient share of the Federal government's contribution towards the construction of our national highway system," President Weeks declared.

"Automobile registrations are increasing approximately three times as fast as highways are being built, with the result that traffic conditions are becoming so congested in certain areas as to make the use of an automobile both unpleasant and economically unsound. It is a well established fact, that the nation pays for good roads whether it has them or not. The operation of an automobile over an unimproved highway is much more expensive than over an improved one.

"At the outset the Federal government appropriated $100,000,000 annually for Federal highway aid, this sum being later reduced to $75,000,000. Under the act, none but major highways may be improved, and aid to the secondary highways is totally prohibited. Altogether there are approximately 3,000,000 miles of State and Federal highways in the country, the major portion of which are being used by the Federal Government in daily delivery of the mails and for military purposes.

"This general use of the highway system by the Federal government; the fact that the government has collected from the motorists of the country, in excise taxes, approximately twice the sum expended in Federal aid, coupled with the further fact that our road building program is annually falling farther behind the increasing registrations, should be ample argument for not only a continuation of the Federal-aid program, but for materially increasing it," President Weeks declared.

A prediction that Congress, whether it be Republican or Democratic, must soon augment the Federal-aid program and amend the act to permit improvement of secondary, and faster construction of primary highways, was voiced by the motoring head.

Rotary Tubular Kilns for Cement

The refractory lining of the kiln immediately behind the high-temperature zone is also provided with a ring-shaped projection, and the tubular clinker cooler is fitted internally with similar projections of refractory material in the upper portion of the cooler and of metal in the lower portion. O. Bouzin. (British Patent 288,114.)

NORTHAMPTON QUARRYING COMPANY CHANGES SCHEME OF OPERATION

IN THE interval between the description of the plant of the Northampton Quarrying Company of Northampton, Pennsylvania, which appeared in Pit and Quarry, October 13, 1926, and the present, the scheme of operation has been completely reversed, new equipment added, locations of different units changed and the production increased. It is, therefore, interesting to note the changes and benefits which accrued as a result of them.

The operations were entirely suspended for a part of last winter, help was secured and the necessary additions were made, which included the complete rearrangement of the plant and railroad facilities.

Overburden, as stated in the previous article, varies up to 30 feet in thickness and is stripped by a number 28 Marion steam shovel, which has been completely overhauled. It is hauled away in trucks or narrow gauge side dump cars. New end dump cars are being constructed to replace these and a ground hopper equipped with a large drop bottom Weller gate is being installed under the runway leading to the crushing plant to accommodate refuse. A switch turn out section for loaded and empty cars has been installed in the quarry and the switching operations have been made much less laborious and more efficient.

The holes in the quarry, drilled by Loomis Clipper drills, are spaced at about 12 feet, drilled 5½ inches in diameter and about 5 feet in depth. As some water is encountered, giant gelatin 50 per cent dynamite is used at the bottom and Atlas 50 per cent extra is used on top for primary blasting. Secondary drilling is done by Ingersoll Rand jackhammers with 80 pounds air pressure, supplied by an Ingersoll Rand compressor. Atlas 30 per cent extra dynamite is used for secondary blasting. In all blasting operations, approximately three tons of rock are obtained for each pound of powder consumed.

Chemical stone, cement mill stone, blast furnace stone and crushed stone are produced, which, with the present production, necessitates loading by hand. Eight four ton 36 inch gauge cars, instead of five, as in the previous description, are being used, and the ninth is under construction, to convey the quarried stone to the mill. The cars are hauled to the bottom of the incline by horses and hooked to the hoist cable to be pulled up the plane, which has a slope of 25 degrees at the maximum point. Power for hauling is supplied by a Flory hoist, which pulls the car at the rate of 280 feet per minute to the top of the incline, requiring about 1¼ minutes.

For primary crushing, the stone is dumped into a chute and fed to a number 20 D. Champion crusher, set at from three to four inches and running at 90 r.p.m. It is discharged from the crusher on a 30 inch belt conveyor with 30 foot centers, running at 180 f.p.m. and deposited at a "switching point." From here, it may be taken any one of several ways. It may be passed directly through a chute into railroad cars or it may go to a bin, known in this description as hopper A, to be passed through the crushed stone plant; the coarse material may be passed to the railroad cars, after passing over a grizzly, and the fines returned through the crushed stone plant.

The material which is to pass through the crushed stone plant is fed from the hopper into a Good Roads 50 foot center return track elevator of 50 tons per hour capacity when traveling at 250 f.p.m. to an 18 foot by 38 inch Champion revolving screen making 16 r.p.m.

At this point the disposal of the oversize is dependent upon the nature of the material and the demands upon the plant. If it is to be used for chemical stone, it drops into a tailing bin which is tapped into railroad cars. If it is to be crushed, it passes into a new bin, which holds about ten tons, and is fed through a Weller rack gate to a Number 6 Champion crusher instead of using a belt conveyor, as was being done at the time the previous description was written.

The crusher has been moved from its previous position to a new and large foundation, equipped with a pit which is easily accessible for repair work and may be used for removing chokes and spills. It is set at two inches and is driven by an individual double drive line shaft at 140 r.p.m. The power is derived from a 30 h.p. Westinghouse slip ring motor. From the crusher, the material is discharged into a sheet iron hopper and flows onto a 20 inch Jeffrey belt conveyor.

This conveyor, which was formerly located on top of the bin, has been changed and lengthened from 46 to 68 foot centers and travels under the bin. It is driven by a 5 h.p. Westinghouse motor at 275 f.p.m. and takes the stone up an incline in excess of 15 degrees, where it is discharged into the third crusher.

This third crusher, which is a number 4½ Traylor finishing crusher, is located at the point from which the Champion number 6 was removed. It has a rated speed of 650 r.p.m., but, at present, it is operated at 550 r.p.m. and may be set at from ½ to 1 inch. From the crusher hopper, the material passes into the bin at the "switching point," which is known in this description as hopper A.

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If coarse material is desired, arrangements have been completed to eliminate the Traylor crusher, by dropping the Traylor hopper and chuting directly into hopper A.

The railroad side of the bins have been completely equipped with Weller gates and chutes. A drop bottom Weller gate has been installed in number 4 bins to permit of its contents being drawn out on to the Jeffrey 20 inch conveyor and taken to the Traylor finishing crusher for recrushing.

Among the advantages gained from remodeling the plant are, increasing the capacity of the plant from 150 to 400 tons per day when the so-called three-quarters are the largest size desired, and from 400 to 500 tons per day when stone up to 2¾ inches is desired. During the month since the plant has been operating under the changed conditions, over 400 tons, with the largest size 1½ inch, have been produced in nine hours. Due to the total elimination of the smaller sizes, the screen has been relieved of much of the heavy circulating load formerly experienced, which reduces the power expended on the operation.

Since the former description appeared in Pit and Quarry, there have been some changes in the management personnel. W. A. Reyner is now president and superintendent; E. O. Reyner, treasurer and general manager; Frank D. Wagner, general foreman; and R. E. Graul, sales representative.

Tire Costs Decreasing

Each motorist in the United States, during the year ending April 1, 1928, wore out 1.9 casings and 2.4 inner tubes in the operation of his automobile, according to compilation of the American Motorists Association, based upon figures showing that during that period 45,929,000 casings and 55,251,000 inner tubes were manufactured and sold in this country.

A fact of interest to the motorist is revealed by the figures showing that, while the net registration during the 12-month period increased more than 1,125,000, there was no corresponding increase in the number of inner tubes used by the motorists. The comparative figures show that during the year ending April 1, there were 55,251,000 inner tubes sold, compared with 56,721,000 sold during the year ending April 1, 1927, which represents a decrease for the year of 1,470,000 inner tubes. During the same period there were actually 1,126,922 more automobiles on the road.

This is due to the fact that low pressure balloon tires are becoming more common, and experience, as well as the actual figures, show that inner tubes in balloon tires last longer, it is pointed out by J. Borton Weeks, President of the Association. "Two other factors contribute, however, to the decrease in the number of inner tubes used. One of these was due to the high prices of rubber, which resulted in the motorist frequently having the tube repaired rather than replaced, and the other factor being that tubes are generally better built each year."

Reduce Air Mail Rates

It will cost only one-quarter as much to send the average business or social letter by air mail on and after August first as it does now, for on that date the rate will be reduced from ten cents a half ounce to five cents for the first ounce or fraction and ten cents for each succeeding ounce or fraction. This means that an ordinary letter may be sent anywhere in this country for five cents and that an air mail package which now requires $2.00 postage may then be sent to any part of the country for $1.05.

The regulations on air mail are simple. Any mailable matter (except perishable matter liable to damage by freezing) may be sent by air mail. Registered, insured and C. O. D. matter is carried by air mail, as are packages not exceeding fifty pounds in weight and not exceeding 84 inches in length and girth combined. Special delivery stamps still further expedite delivery of domestic air mail.

Air mail may be deposited in any mail box, but sufficient time should be allowed for collection and transport to the Main Post Office in time for shipment to the air mail field. Distinctive air mail envelopes are desirable, but not compulsory, but the words "Air Mail" or "Via Air Mail" must be clearly endorsed on the envelope or wrapper.

This new low rate, effective August 1, holds out tremendous possibilities for the American business man. This reduction comes when the air mail companies are giving the most dependable service in their history. The man or woman using air mail for business or social correspondence has the benefits and connections of twenty-eight air mail routes over 12,457 miles, serving 62,000,000 people directly and millions more indirectly. Each twenty-four hours the mail planes fly 24,914 miles and their daily average mail load now exceeds three tons. Air mail averages more than 100 miles per hour and planes are flown night and day in fair or foul weather.

Speed is the essence of air mail service and the record of efficiency established by the air mail in the last ten years, during which time nearly 16,000,000 miles were flown and 302,000,000 letters carried, merits the patronage of every business man and woman.

It behooves every alert business man to instruct his mailing department to determine where and how time and money can be saved by use of air mail. Each day there is some striking instance of how air mail, which means speed, has been profitable to American business.

PIT AND QUARRY FOREIGN DIGEST

Wide-Porous Active Silica

(A) Active silica gels with wide pores, particularly suitable for the absorption of gases and vapors at high partial pressures and saturated, or almost saturated, vapors, are prepared by washing a silica jelly, before or during drying, with such a solution as to impart to it pH 7-10. E.g., a jelly prepared by stirring 550 litres of sodium silicate solution, d. 1.164, with 51 kg. of sulphuric acid, 46 kg. of ice, and 60 litres of water, and subsequently heating the mixture, is washed until it gives a red-violet coloration with cresol-red, preferably with water treated with alkalis to give the same coloration, after which it is dried in a current of air at 150-200 degrees. (B) Gels with fine capillary pores, having a high absorptive capacity for gases and vapors at low partial pressures, are prepared by a process similar to that described in (A), except that the jelly is washed until it has pH 2—5.5, i.e., until it gives a yellow to blue-green coloration with bromocresol-green, water acidified with hydrochloric to give this coloration being used for the washing. I. G. Farbenindustrie. A. G. (British Patent, 263,198.)

New Transportation Methods in the German Cement Industry

Figure I shows the basic principles of the arrangement of the Bliechert single cable way for the transportation of 15 tons of limestone per hour. Figure II illustrates a single cable way 750 yards long for the transportation of 12 tons per hour of heavy spar. Figure III shows a swinging "cable crane" for the transfer of coal. The span is 280 yards. Capacity 250 tons per hour. Figure IV shows a car unloader on a

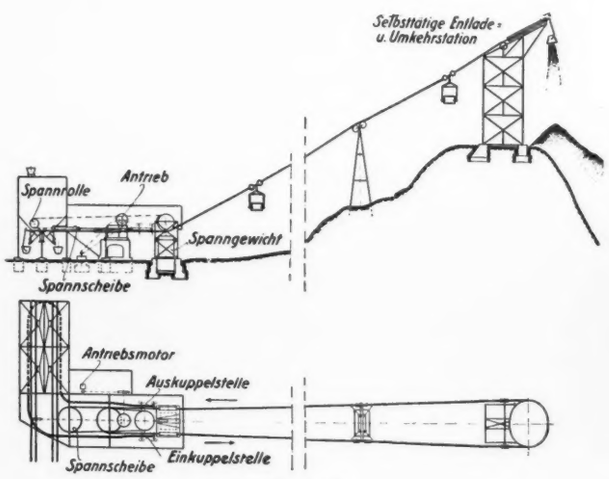

Figure One

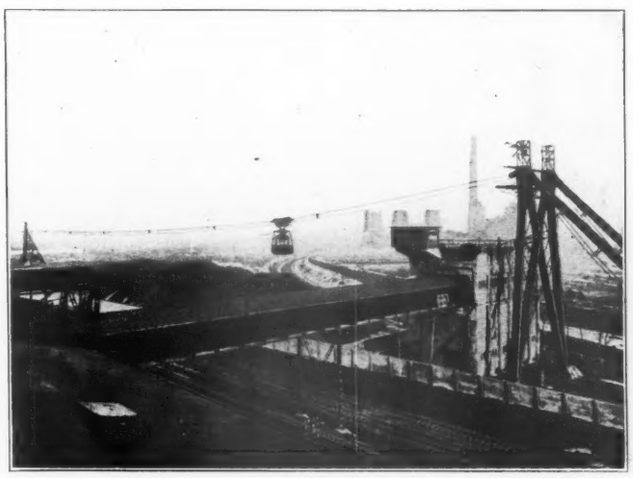

Figure Three

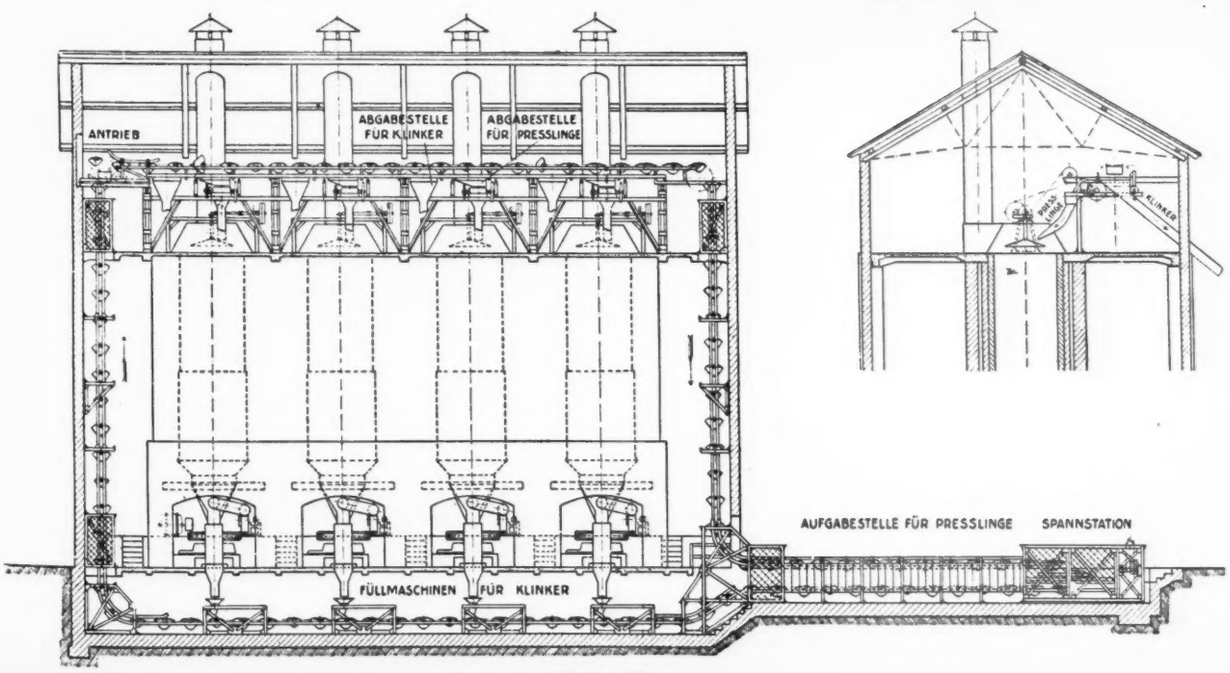

Figure Five

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Figure Two

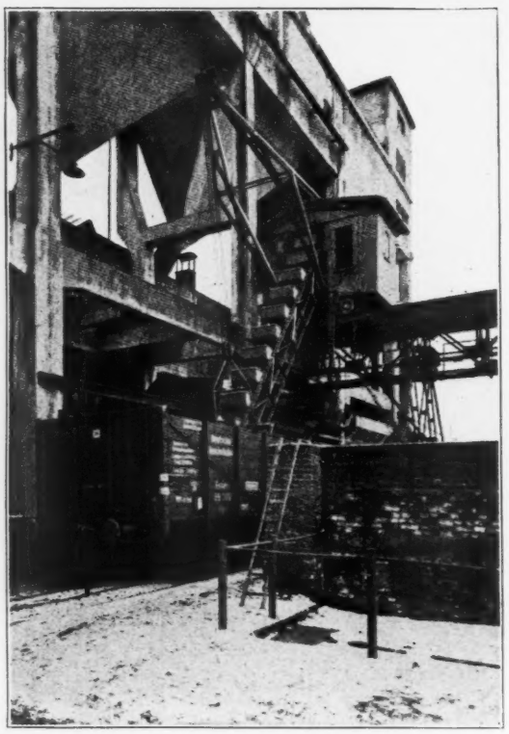


Figure Four

traveling bridge with a built in traveling conveyor. Capacity 50 tons per hour. Figure V shows a plant 120 yards long for mixing 4,000 fuel briquettes and 9.5 tons of clinker for the rotary kiln of a Portland cement plant. Bruckmann, (Zement, May 24, 31 and June 7, 1928).

Figure 1

Spontaneous Discharge—u.
Umkerstation = Automatic unloading and return part.

Antrieb = Drive.
Spannrolle = Tension rolls.
Spannscheibe = Tension pulley.
Spanngewicht = Tension weight.
Antriebsmotor = Drive motor.
Auskuppelstelle = Exit coupling point.
Einkuppelstelle = Entrance coupling point.

Dangers of Gypsum in Concrete Work

Concrete often comes in contact with sulphates, especially in subterranean work. Part of the lime which otherwise would form calcium aluminate is then transformed to gypsum during setting. This further combines to form a double salt of lime and alumina which resembles alum in its tendency to absorb water. This absorption causes swelling and destruction of the concrete. The water used for mixing must be not only clear but the sulphate content must be low. Another point to be examined is the environment of the place at which the concreting is done. The neighborhood of chemical or gas works is dangerous. Addition of trass to Portland cement is recommended. The environs of a concrete casting should be drained to prevent sulpates from attacking the lime. If this is not possible, a coating of tar should be applied. Franz Fammler (Revue de la Chambre Synd. des Entre. de Maconnerie, April, 1928).

High Quality Cement and Cold Water

Inconclusive previous investigations led the author to prepare standard mixtures of ordinary Portland, high quality Portland and aluminous cements and to investigate their setting times, tensile and compressive strengths when cured under usual temperature conditions and in ice water. The effect of ice water on both ordinary Portland and high quality Portland was very considerable although the latter attains a greater strength than the former in a shorter time. The aluminous cement, however, showed a very slight retardation of setting period, and very small reductions in strength when ice water was used for curing. Setting in ice water lengthened the period before setting started, of (1) ordinary Portland by 128%, (2) high quality Portland, 200%, and (3) aluminous cement only 23%. The interval of setting was increased in the case of (1) by 234%, of (2) by 180% and of (3) only 25%. While after 3 days the high quality Portland showed a loss of strength (in ice water) of 63% tensile and 68% compression, this loss in the case of aluminous cement after only 1 day was 22% and 32% for the respective tests and after 2 days only 12 and 19%. The essential practical result shows that aluminous cement when set at low temperatures exhibits practically no retardation of setting. The only ill effect would result from a temperature so low that the setting water would freeze to ice before setting begins, an interval of about three-quarters of an hour, in which case hardening would be entirely prevented. The excellent setting and hardening properties of aluminous cements at very low temperatures has been entirely corroborated by the author's work in practice on a large scale. H. Vierheller (Zement, June 7, 1928).

NEW PLANT COMPLETED IN WEST MICHIGAN FOR RECLAIMING AND SHIPPING BY BOAT

WAVES from Lake Michigan wash the fine, clean sand up from the lake bed and the prevailing winds from the west blow it into huge mounds or "dunes" several hundred feet high. Because the vegetation is too sparse to bind the sand, these dunes are constantly shifting. Often roads are covered and even whole houses are gradually buried beneath tons of sand. In the vicinity of Muskegon, Michigan, the sand is uniform in size, clean and especially well suited for making the sand cores used by foundries in making intricate castings. The West Michigan Sand and Fuel Company bought a large area of this wild "dune" land and are planning to reclaim and ship the sand by boat to the large ports on the Great Lakes. It is estimated that the supply purchased will last five to ten years. After this time the land will be levelled and will then be ideally suited for summer cottages which will overlook the beautiful Lake Michigan.

The West Michigan Sand and Fuel Company has recently effected the installation of a new sand reclaiming and loading system just inside the bay on its property at Muskegon, Michigan, that presents several interesting features. The dunes to be levelled are on the neck of land between the bay and the lake. A large dock has been built in deep water where even the largest of Great Lakes freighters, handling bulk cargoes, can be loaded with this fine, clean core sand. Owing to certain physical features of the property, it has been possible to simplify the system considerably. There is an extensive water frontage, with a depth close to shore sufficient to accommodate the largest vessels,

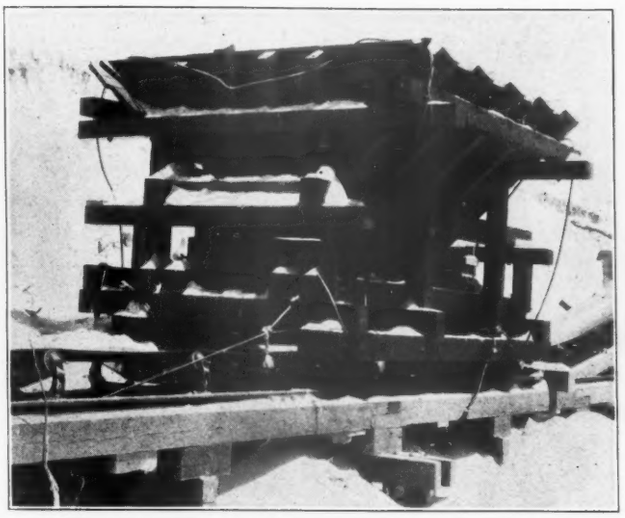
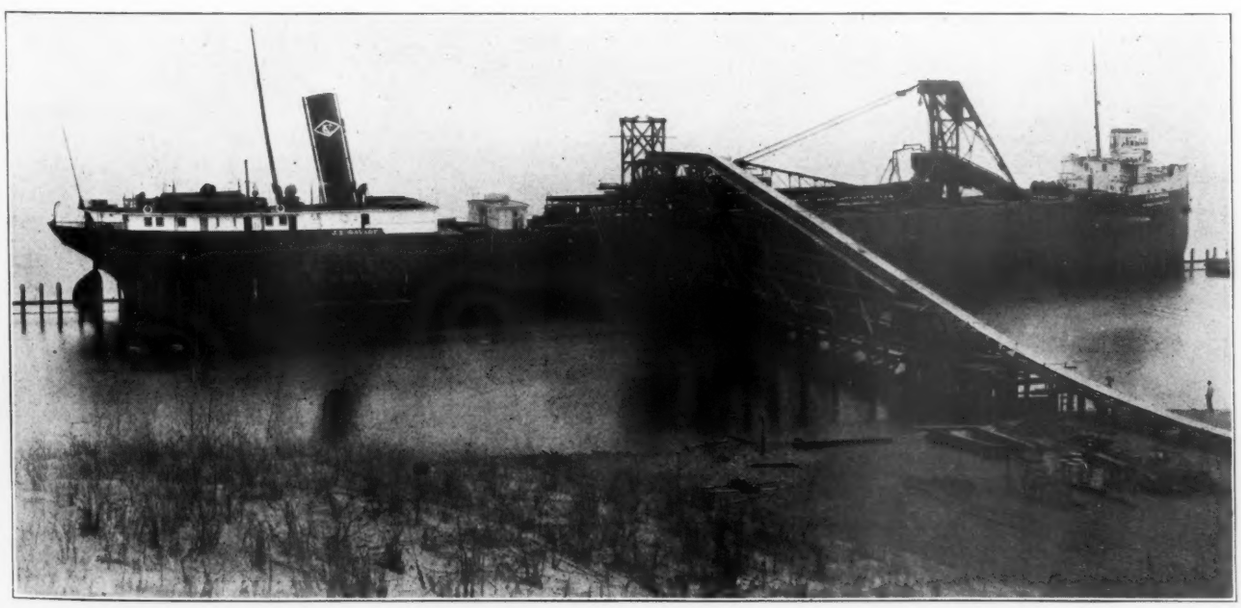


Figure 2.—Close-Up of the Field Hopper

and the sand is sufficiently clean to render an elaborate screening system unnecessary. Essentially, the system consists of a 50 h. p. Marion electric shovel of 1½ yard capacity and a series of Stephens Adamson, Timken bearing-equipped belt conveyors, having a total length of about 1200 feet. Power for the whole installation is supplied at 480 volts from a 300 KVA, 7,200/480 volt, 3 phase, 30 cycle transformer located on the property. The maximum loading rate of the equipment is 1,500 tons per hour, the normal rate being 1,200 tons.

The system is divided into two sections which for all practical purposes, operate as separate units. One, which may be called for convenience the reclaiming section, comprises the equipment used in winning the sand from the pit, and conveying it



View of Belt Conveyor Which Extends the Length of the Tunnel, Elevates to Dock and Discharges to Shuttle Which Extends Over the Ship

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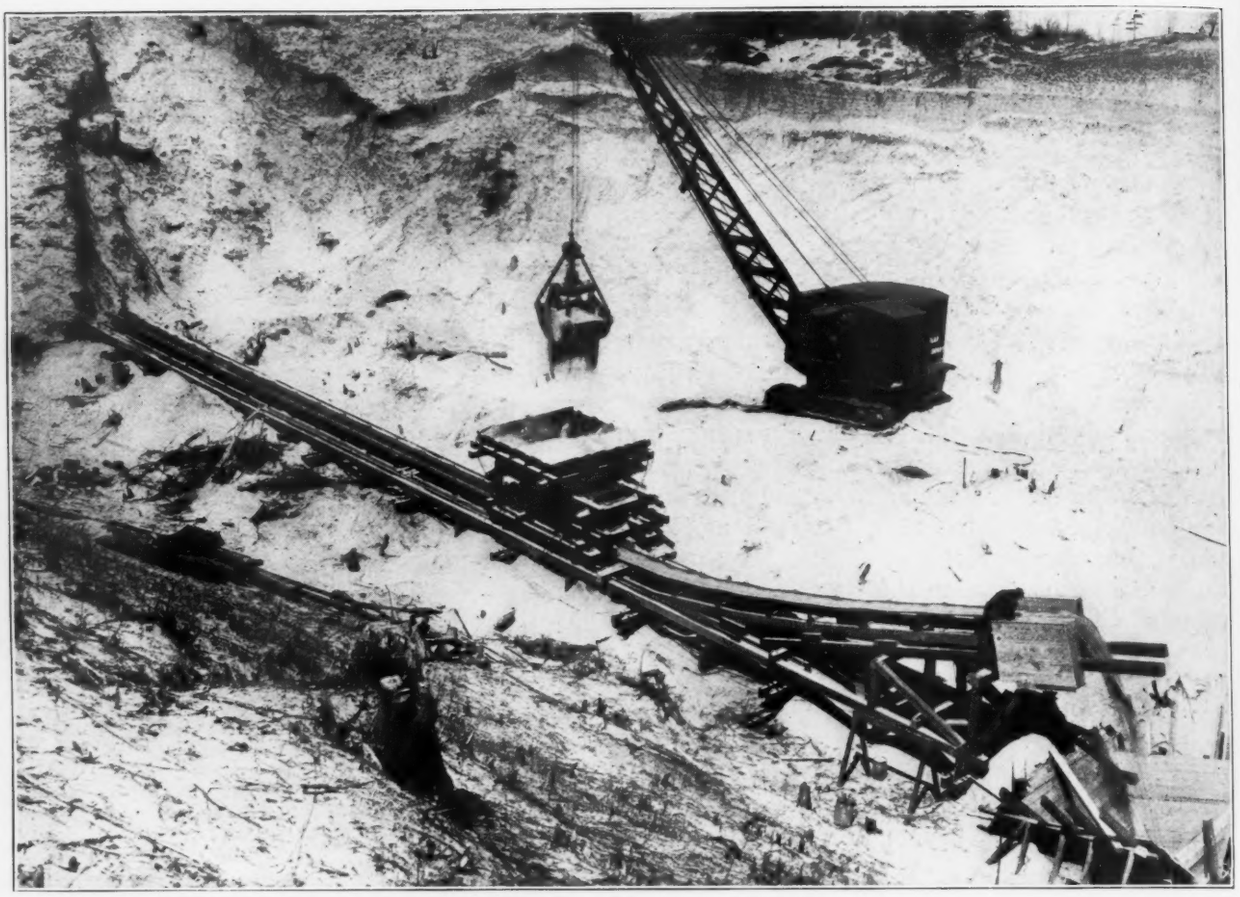
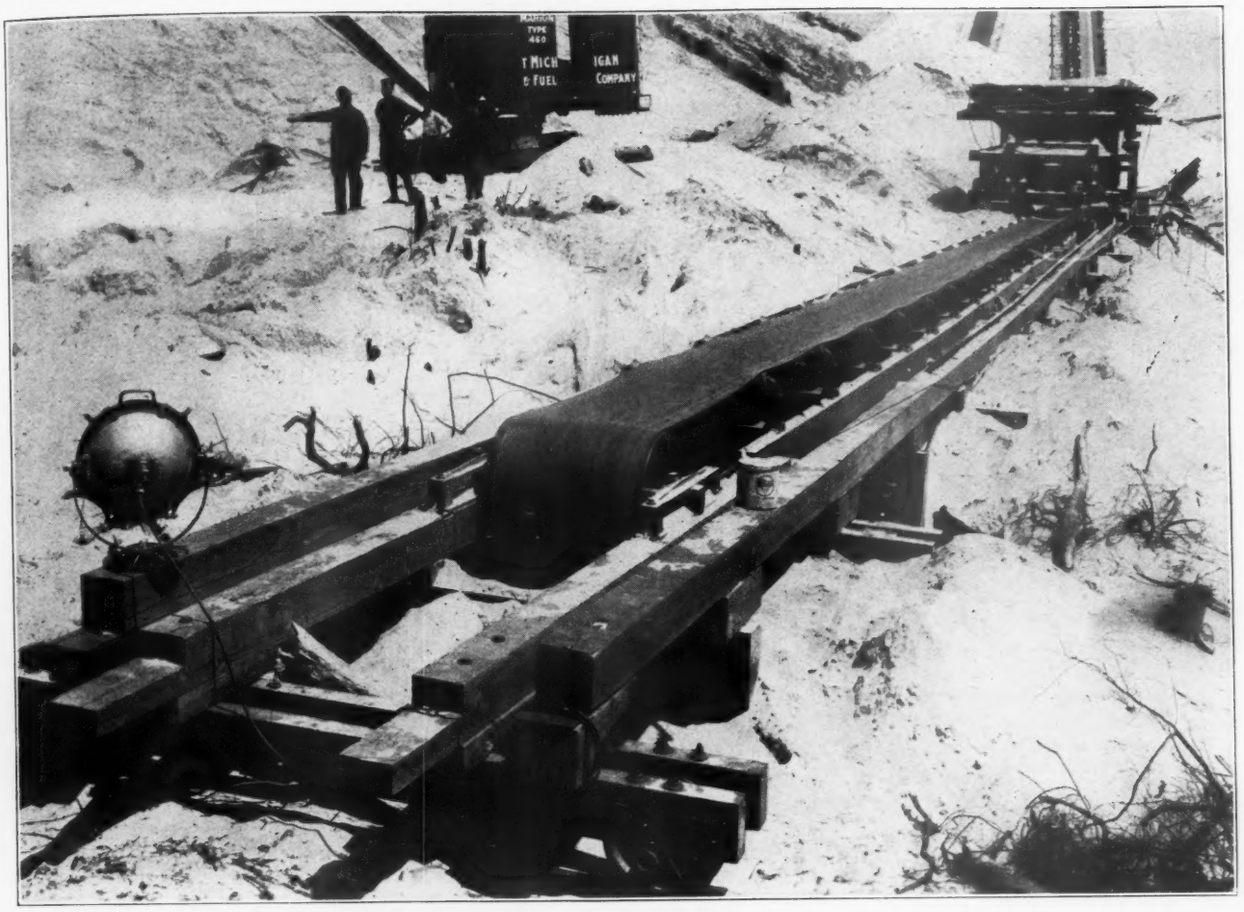


Figure 1.—General View of Pit Showing Shovel and Hopper

Figure 5.—General View of the Loading Conveyor



Field Conveyor—Note Flood Lights for Night Operation

Close-Up View of Storage Conveyor From Field Conveyor to Shuttle

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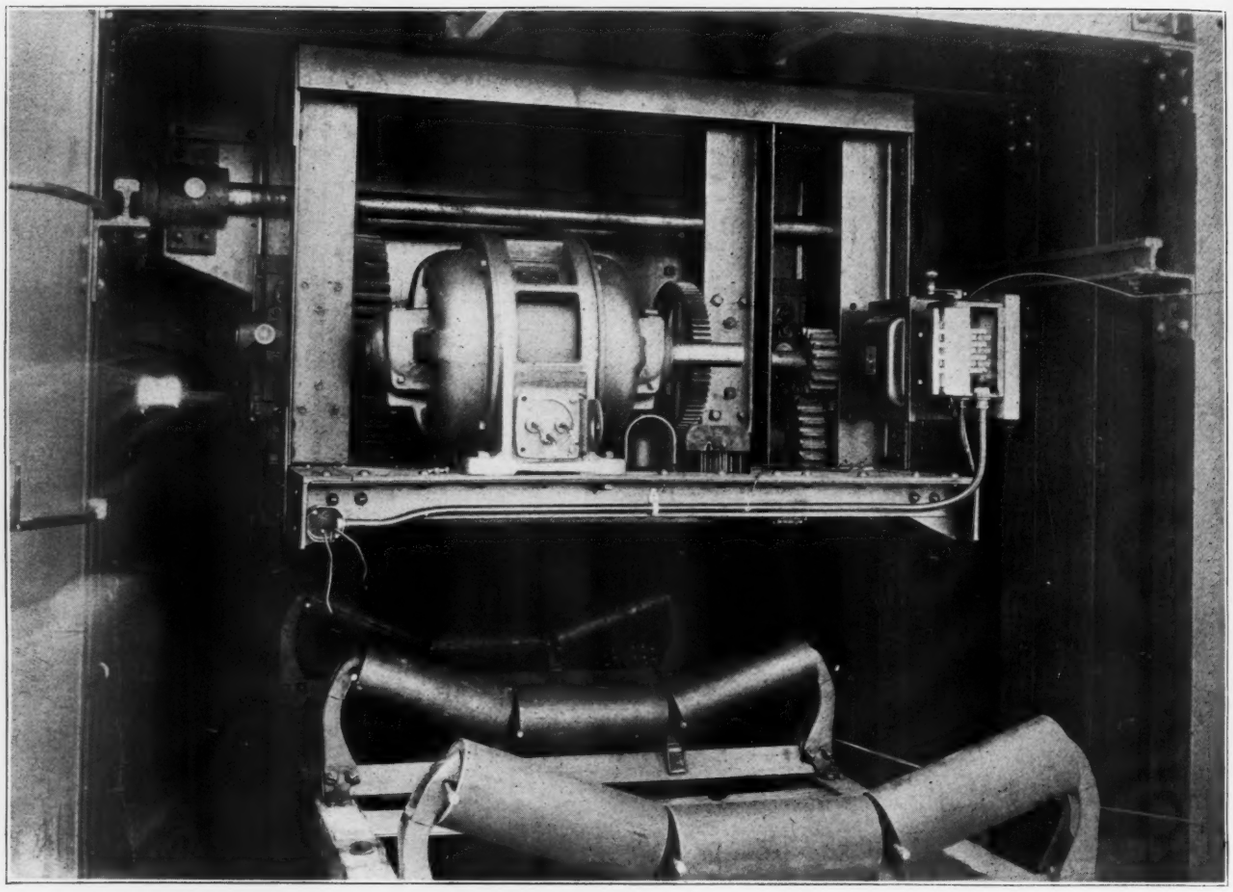

Tunnel Reclaiming Conveyor and Traveling Feeder

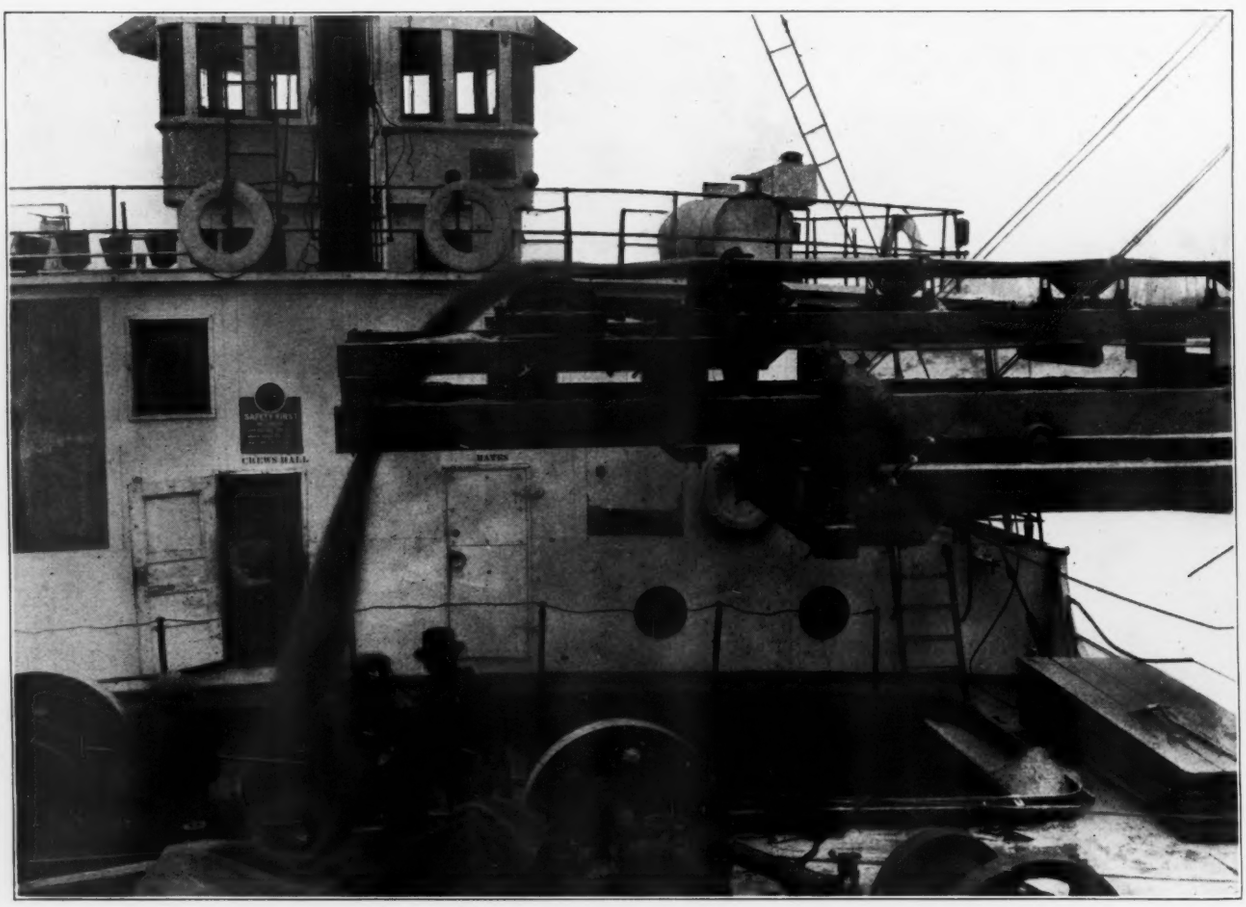

Figure 6.—Loading By Means of the Shuttle Conveyor

to the storage pile, and the other that used in loading material from the storage pile onto the vessel. One of the outstanding characteristics of the former section is the flexibility which has been incorporated in its design and construction, not only as regards its physical features, but as regards the method of supplying power to the various members as well. Such flexibility has been rendered necessary by the conditions of the service. In the case of the reclaiming and loading equipment, flexibility is not necessary to the same degree, since the position of the various members is more or less fixed. How this works out in practice can probably best be seen from a description of the operation of the two sections.

A general idea of the equipment, and method of operation of the reclaiming section can be gained from Figure 1. In this case sand is transferred from the pit to a traveling hopper on the field conveyor by the electric shovel. The shovel itself is supplied with power at 480 volts by a flexible cable some 400 feet long, that may be plugged into any-one of several conduit outlets located at various points on the frame work that supports the conveyor leading to the storage pile. The field conveyor, which is 140 feet between centers, is supported on a heavy wooden frame work, equipped with trucks at frequent intervals, so that it can be swung about the delivery hopper as a pivot. The loading hopper is also equipped with trucks which run on a track mounted on the frame work that supports the conveyor, so that it can be moved the whole length of the conveyor, and spotted wherever convenient for the shovel. Figure 2 shows this construction quite plainly. Power for operating the 15 h. p. motor that drives the mechanical feeder mechanism of the hopper, and for the 15 h. p. motor driving the conveyor, is supplied through flexible leads from outlets on the storage conveyor framework. These motors are provided with individual control from push buttons located at convenient points. By virtue of the arrangements adopted, operations over a wide area are possible, with the reception end of the storage conveyor established as a fixed point.

Material from the field conveyor passes through screens, onto the receiving end of the storage incline conveyor. This conveyor, which is 324 feet long, with a rise of 74 feet, is driven by a 50 h. p. motor, located on the structure above the storage pile. It delivers the sand to a fixed hopper, which opens onto a shuttle conveyor, which delivers it to the storage pile proper. The latter conveyor has a length between centers of 115 feet, and its carriage runs on a track about 300 feet long, extending over the whole storage space. The conveyor proper is driven by a 15 h. p. reversible motor, with push button control, and the trolley

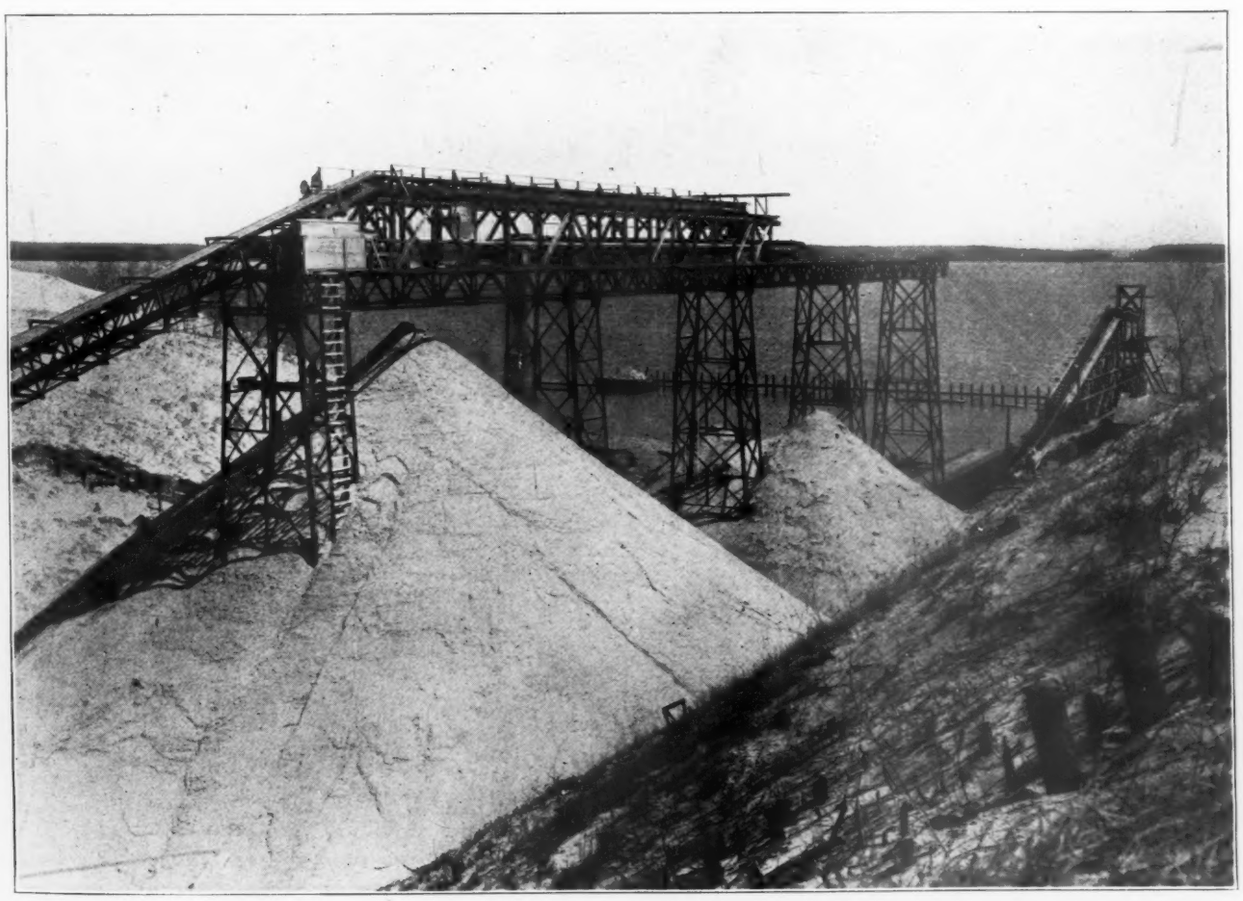

Figure 3.--General View of the Inclined Storage Conveyor and Shuttle Conveyor Arrangement. This View Also Shows Part of the Reclaiming Tunnel and Loading Dock

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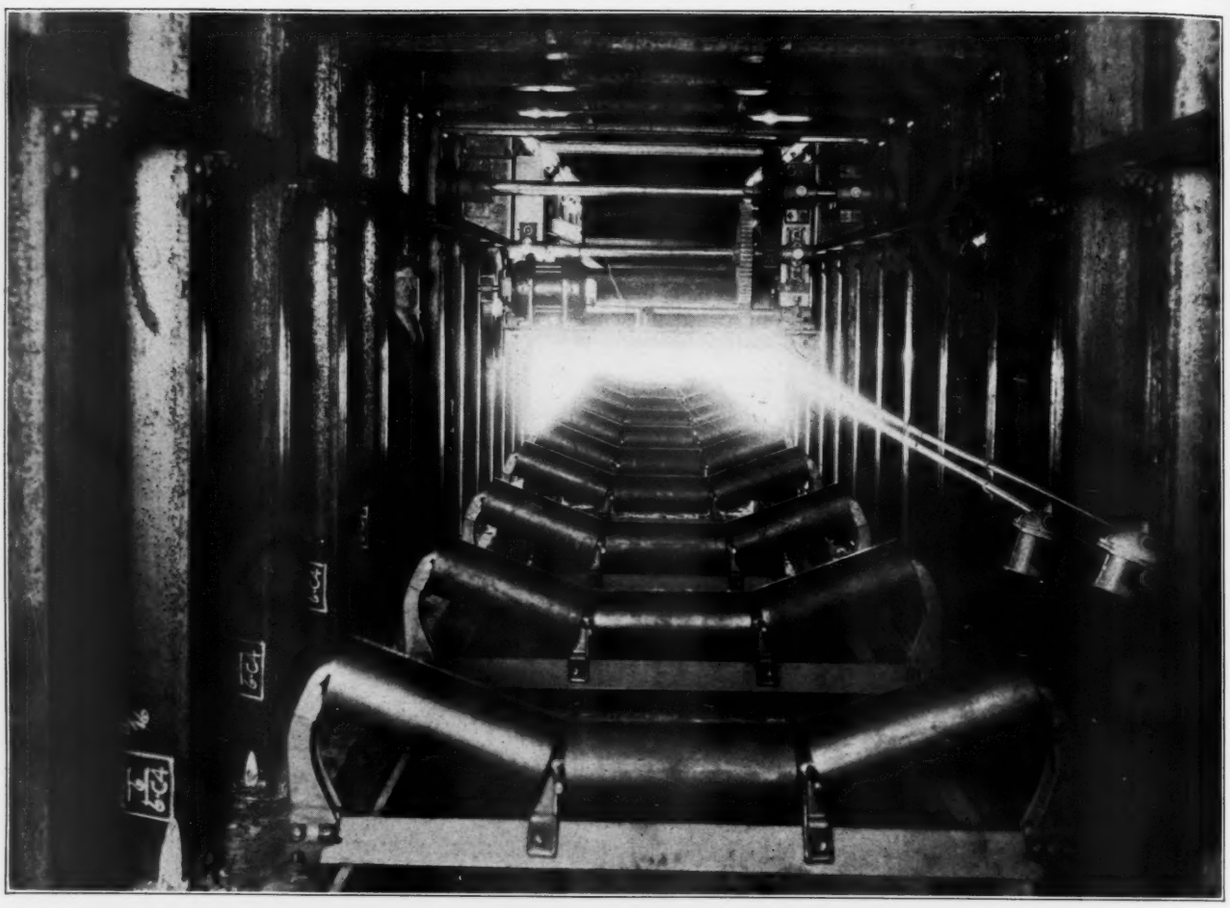
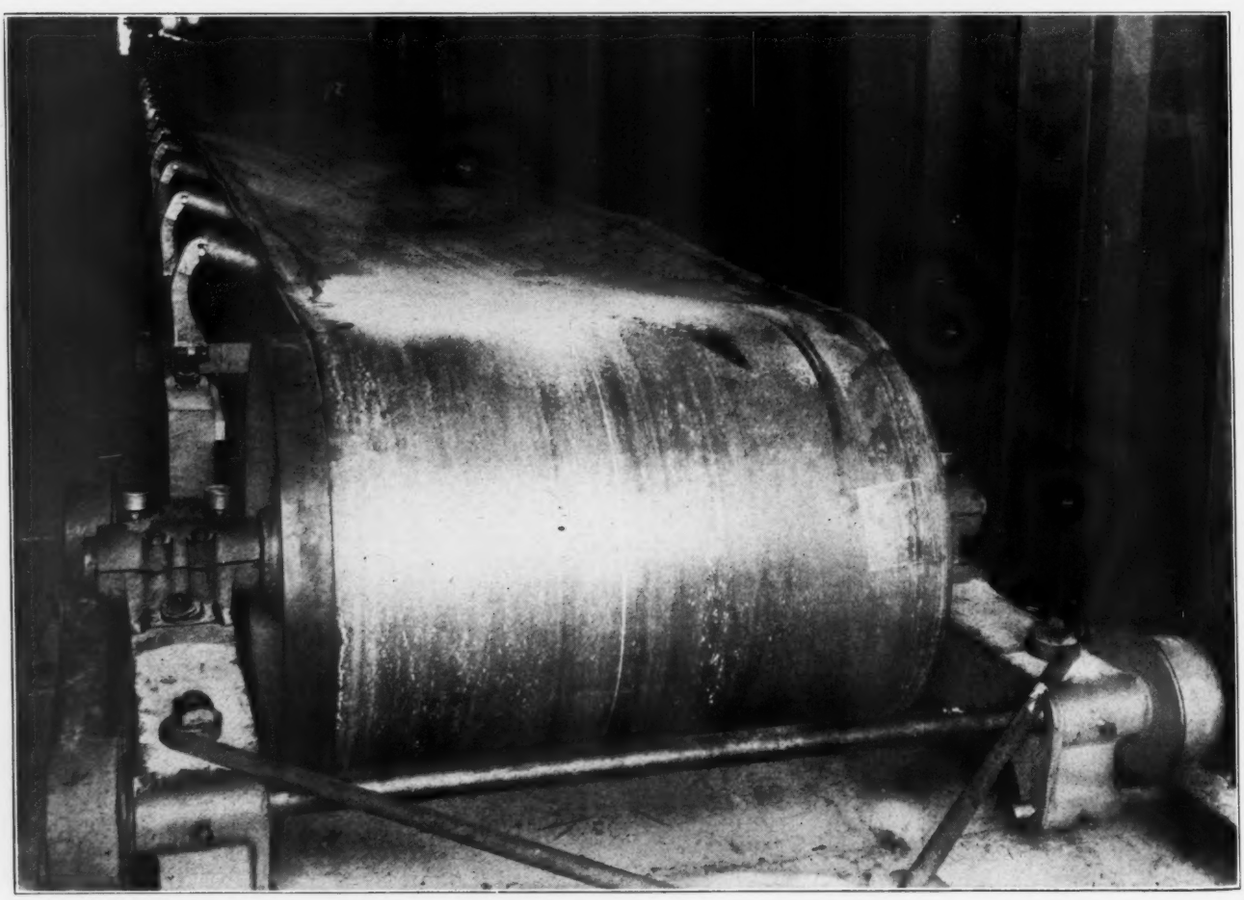


Figure 4.—Interior of the Storage Reclaiming Tunnel



Take-Up Pulley for Tunnel Conveyor

motion of the shuttle carriage is also driven by a 15 h. p. motor with reversing control. The hopper which delivers sand to this conveyor is arranged for two way delivery, which is accomplished by a manually operated deflection plate which directs the outgoing sand in the direction of the conveyor belt travel. The general arrangement of the storage equipment is shown in Figure 3. As a result of this arrangement, sand is delivered from the pit to storage at an average rate of about 250 tons per hour, it being possible to increase the rate to 400 tons per hour, if desired.

The operation of the loading unit is substantially as follows: The base of the storage piles is formed by a tunnel, some 350 feet long, constructed from heavy concrete slabs reinforced every three feet by arches made of steel I-beams, those forming the top being 16-inch, and those on the side 12-inch section. The base of the tunnel is a solid reinforced concrete slab weighing over 50 tons, and the roof is formed by 2x6 timbers, placed on edge. As a result of this construction, it will be possible to move the tunnel bodily to a new location when the sand in its present vicinity is exhausted. When sand is to be admitted to the feeder mechanism in the tunnel, enough of these timbers are removed to permit a steady flow of sand into the hopper. The sand from the hopper is delivered to the main conveyor belt by a 26 foot feeder conveyor mounted on a frame which is suspended between overhead tracks on each side of the tunnel. Power for operating the 15 h. p. motor which drives the conveyor belt, and the 15 h. p. trolley motion motor is obtained by flexible leads which may be plugged into any one of a number of conduit outlets that are spaced along the tunnel walls. Figure 4 not only gives an idea of the construction of the tunnel, but shows the method of mounting the feeder conveyor, and the connection outlets that are provided. Two of these are provided at each station, since the two motors are on separate circuits, that for the trolley drive motor being controlled from a push button mounted on the conveyor frame. Thus the feeder conveyor may be spotted at any point in the tunnel, for convenience in receiving sand from the storage piles.

Sand from the feeder conveyor is delivered to the main loading conveyor which runs the entire length of the tunnel and out over the loading pier, which extends about 200 feet into the lake, to the deck. This conveyor, which has a total length of 600 feet, is driven by a 125 h. p. motor, at a belt speed of 500 feet per minute. The angle of rise, as shown in Figure 5, is about 16 degrees. The sand from this conveyor is delivered through a two way hopper, similar to that described in the case of the storage incline conveyor, to a shuttle conveyor, 52 feet long, which is driven by a 15 h. p. motor. One of the interesting features of this arrangement is the fact that the three conveyor drive motors are controlled from a single push button station. Pushing the "start" button on this station actuates an automatic control which starts the motors in sequence, the shuttle conveyor motor starting first, then the main conveyor motor, and then the feeder conveyor motor. Pushing the "stop" button stops them in reverse order. As a result no motor is started under load, and all motors are protected from overload conditions caused by improper sequence in starting and stopping.

When vessels of considerable size are to be loaded, they are moored to a dock extending 250 feet on each side of the conveyor pier. This dock is provided with three 30-foot mooring piers, one at each end, and one in the middle, so that the vessel can be warped along so as to bring the forward and after hatches directly under the delivery end of the shuttle conveyor. An extension to the track on which the latter runs has been provided, which, when not in use is hauled back against the end of the pier. When lowered, it extends out about 25 feet over the ship, as shown in Figure 6, so as to bring the shuttle well out over the hatch. A limit trip switch is provided in the shuttle trolley motor circuit which prevents the shuttle being run out too far from the end of the pier. Barges can be loaded either inside or outside of the dock. In the latter case, the shuttle conveyor is run back on the track until its delivery end is directly over the barge, the extension not being used. The rate of loading is altered from 1200 to the maximum of 1,500 tons per hour by adjusting the speed of the three conveyor motors. Adjustment of the speed does not, however, affect the sequence in starting or stopping, nor does it affect the speed relation between the motors. For example, at any given speed of the main conveyor motor, the speed of the feeder conveyor motor is greater to a definite degree, and the same relation is preserved throughout any changes that may be made.

There are several features in this plant of special importance. The arrangement of the swinging field conveyor will enable the West Michigan Sand and Fuel Company to store the largest possible tonnage with a minimum of equipment. As the sand in the operating radius is removed, a second field conveyor will place a greatly increased tonnage within reach. Another feature is a traveling feeder in the tunnel which enables the operator to reclaim every possible ton of sand.

The West Michigan Sand and Fuel Company plant was designed and is being operated by the following men: Mr. McKee, president; Mr. Nugent, general manager, and Mr. Eke, superintendent. Mr. E. P. Escher, engineer in charge of the Stephens Adamson office in Detroit, designed and furnished the storing, reclaiming and belt loading conveyors in cooperation with these men.

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Record Building Activity in Canada

During April 63 Canadian cities granted building permits valued at $18,527,846 as compared with $14,916,247 during March and $17,312,470 in April, 1927. The aggregate for the first four months of this year exceeds all records since 1920. The greatest gains were made in the Provinces of Ontario and Alberta, where increases of 30 per cent were made in April over March reports. New Brunswick, Manitoba, Saskatchewan, and British Columbia also registered increased activity, but Nova Scotia and Quebec reported declines of 93 per cent and 11 per cent respectively. Building costs continue lower than in any of the last eight years except 1927.

Gold Production In U. S. Low

The mint bureau and bureau of mines, reporting on gold production of the United States in 1927, shows the smallest annual output in 33 years, less than half the war time production of 1915 and represents a steady decrease in every year since 1924. The 1927 output is given as $45,418,600 compared with $48,269,600 in 1926; $49,860,200 in 1925 and $52,277,000 in 1924. The peak production figure in 1915 was $101,035,700. The 1927 figure was the smallest of any year since 1894.

Cost of Maintaining Automobiles

An average of $229 was spent by each motorist in the United States during 1927 in the operation and maintenance of his car, according to figures compiled by the American Motorists Association. Of this sum $101, or 44 per cent, was expended for fuel and lubricants, this being the largest item in the motorist's annual operation and maintenance bill.

The $229 figure does not take into account depreciation. The average life of a passenger automobile, however, according to Federal government statistics, is seven years. During 1927 the average retail price per passenger car in the United States was $953 which, based on a seven year life expectancy, would mean an average depreciation of $136 per year. From this figure, plus the average upkeep cost of $229, it will be seen that the general average cost of operation of a motor car, plus depreciation, is $365 per year or one dollar per day.

The second largest item on the motorist's maintenance bill is for time of mechanics in doing repair work, the motorist expending in 1927, for this item, an average of $47. His replacement parts cost him $41 during the year and his average tire bill was $40. The total operation and maintenance bill of the 23,127,000 motorists of the country last year aggregated $5,300,000,000, the figures show.

Comparing the cost of operation in 1927 with 1926, the Association's figures show that last year the cost was five per cent more than during 1926, when the average operation cost was $219. Comparative figures, between the two years, however, it is pointed out by J. Borton Weeks, President of the Association, do not indicate that operation costs are necessarily increasing. The difference is explained primarily by greater mileage made by the average motorist in 1927 which means an increase in not only gasoline consumption but in tires and wear of replacement parts.

Highway Congress at Mexico City

October 3 to 6, 1928 is the date set for the National Highway Congress to be held. The Congress has been organized under the auspices of the Mexican National Highway Commission. An exposition of road building machinery will be held in connection with the Congress, and demonstration of modern highway construction methods will be given. It is expected that the various Mexican states will be represented at this Congress. The officers of the Congress are: President, Ing. Ignacio Avilez; Directors, Senores A. Gloria, G. Johns, R. Padilla, J. G. Hernandez and Ing. Jose Rivera R. Secretary, Sr. Juan F. Acosta, whose address is Calle Nuevo Mexico No. 90, Mexico, D. F. It is anticipated that machinery and material shipped from the United States for display in the exhibition will be permitted to enter Mexico duty free under bond, and that a reduction in freight rates will be made.

Will Urschel Dies Suddenly

Just as this issue of Pit and Quarry is being prepared for publication, word comes of the sudden death of William Urschel of Toledo, Ohio. Mr. Urschel dropped dead from heart failure. It was known among the friends of Mr. Urschel that he had serious heart trouble and was ordered by his physician to reduce his activity as president of the Wm. Urschel Lime and Stone Company to the minimum. The news of his death will be a great shock to his friends and to the industry.

Construction Important in Exposition

Building and construction will be featured prominently in the Industrial Arts show of the Eastern States Exposition from Sept. 16 to 22 inclusive, the display of building and construction materials being one of the major divisions of this national exhibition, which reaches annually approximately 300,000 people.

Included in the list of building and construction products and kindred lines that will be shown at the 1928 Exposition are architectural developments, brick and clay products, building construction, electrical goods and supplies, engineering construction, farms and farm operating equipment, hardware, iron and steel, metal work, lumber, paint and varnish, plumbing, heating and ventilating systems and equipment and woodwork.

INTIMATE NEWS OF MEN AND PLANTS

U. S. Gypsum Suffers Flood Loss

The United States Gypsum Company recently suffered a several thousand dollar loss at its plant three miles west of Loveland, Colorado, when the Louden ditch of the irrigation system in that section overflowed and flooded the factory and warehouse.

Blaine S. Smith Now Heads Penn-Dixie Cement

Blaine S. Smith has resigned as Vice President of the Universal Portland Cement Company to become President of the Pennsylvania-Dixie Cement Corporation, succeeding John A. Miller, who becomes Chairman of the Board. Mr. Miller has been active in the cement business for over 30 years, and prior to the formation of the Pennsylvania-Dixie corporation he was President of two companies which became part of the merger. The Pennsylvania-Dixie corporation has its general offices in New York and owns seven plants in the East and South with a capacity of 11,000,000 barrels of cement annually.

Mr. Smith started work in the Traffic Department of the Chicago and Northwestern Railroad in Chicago, and in 1908 came to the Universal Company equipped with a suitcase, a belief in hard work and a determination not to take no for an answer. Within seven years he was made General Sales Manager, where he is credited with having developed one of the most efficient selling organizations in the country; later he was elected Vice President.

In addition to his successful work with his own company, Mr. Smith served on various committees of the Portland Cement Association, for three years was Chairman of the Committee on Advertising and Publicity, for two years was Vice President, and in 1924 was elected and the following year re-elected President of that organization.

Besides his work in the cement industry, Mr. Smith has spent much time furthering business and industrial interests generally. He has been actively identified with the Chicago Association of Commerce, as chairman and member of important committees, as General Secretary and as Vice President. He also is on the Board of the Illinois Chamber of Commerce and is a Director of the National Bank of Republic of Chicago.

Mr. Smith is a member of the American Society for Testing Materials, American Concrete Institute, Western Society of Engineers, United States Chamber of Commerce, American Iron and Steel Institute, Chicago Athletic Association, Union League Club and Exmoor Country Club.

Sandusky Cement Plant Being Improved

The Sandusky Portland Cement Company of Sandusky, Ohio, is conducting a two-year improvement and rebuilding program calling for an expenditure of more than a million dollars at its Dixon plant, east of the city.

According to Superintendent W. E. Wuerth, a modern 900 h.p. boiler, new coolers, a new air compressing system, and a compressed air conveyor system, carrying powdered stone from the pulverizers to the kiln, have already been installed. Six new concrete silos, each 50 feet in diameter and 100 feet high and with a total capacity of about 400,000 barrels of cement, are now under construction. This will provide the plant with a storage capacity of about 650,000 barrels.

The kiln capacity of the plant is also being increased and the present capacity of 4,500 barrels will be increased to 5,500 barrels.

Plant Superintendent Killed

Floyd W. Schubel, 38, superintendent of the Port Crescent Sand and Fuel Company, lost his life on the 12th of June when he was caught in a sand slide at the company's plant three miles west of Port Austin, Michigan. Mr. Schubel had gone into one of the sand bins with two workmen to start the flow of sand to the conveyor belts, when without warning tons of sand heaped high on the sides of the bin slid into the bin and buried him. The two workmen escaped without injury.

North Carolina Feldspar Plant Planned

The Feldspar Milling Company of Asheville, North Carolina, plans to construct a $150,000 plant near Micaville to work a rich feldspar deposit. Carol Rogers is president of the company and H. A. Dunham is secretary.

Texas Sulphur Plant Under Construction

The Texas Gulf Sulphur Company of New York is making plans for the development of large deposits of sulphur at Boling Dome near Gulf, Texas, and according to Walter H. Aldridge, president, construction is now proceeding on a 7500 horse power boiler plant, machine shops and other facilities. The plant now being erected is expected to cost more than $5,000,000 and, it is estimated, will produce more than 400,000 tons annually. It will be operated by petroleum or lignite, which may be mined from 1500 acres of lignite lands in Milan county controlled by the company. A two mile right of way to the Santa Fe railroad has been secured.

Kansas City Merger

The Stewart Sand and Material Company of Kansas City, Missouri, was recently formed by the merger of the Stewart Sand Company and the Coen Building Material Company, both Kansas City firms.

John Prince is president and Wilbur F. Coen, vice president, of the new corporation, which operates eight material yards in the city. Employees of both firms are absorbed into the new organization. The Stewart offices in the City Bank Building will be retained.

New Pennsylvania Plant

The new $3,000,000 plant of the Keystone Cement Company near Bath, Pennsylvania, will be put into operation early in July, according to an announcement made following a meeting of the board of directors.

The new plant, said to be the last word in cement manufacture, has a capacity of more than one million barrels a year, and will manufacture a quick-hardening cement.

Virginia Lime Plant Sold

S. B. Miley of Toms Brook, and Senator R. S. Wright and Omar P. Stickley of Strasburg, Virginia, recently bought the property of the Rockdale Lime Company in Toms Brook from the John C. Paxton estate.

The property includes the lime plant, quarries, office building and other structures. The plant will be repaired and put in operation in the near future with Mr. Stickley as manager.

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Kansas Portland Receives Safety Trophy

The safety trophy awarded to the Bonner Springs, Kansas, plant of the Kansas Portland Cement Company by the Portland Cement Association for operating the entire year of 1927 without a lost time accident was unveiled and dedicated to the cause of safety on Saturday, June 2nd, at 11:00 o'clock before an assemblage of 600 people. The gathering consisted of employees, their families, company officials, and visitors.

L. J. Wheeler, superintendent of the Bonner Springs plant, who served as master of ceremonies, briefly outlined the object of the meeting and read a number of congratulatory telegrams from prominent men. He then introduced A. J. R. Curtis, of the Portland Cement Association, who, in presenting the trophy, spoke in part as follows:

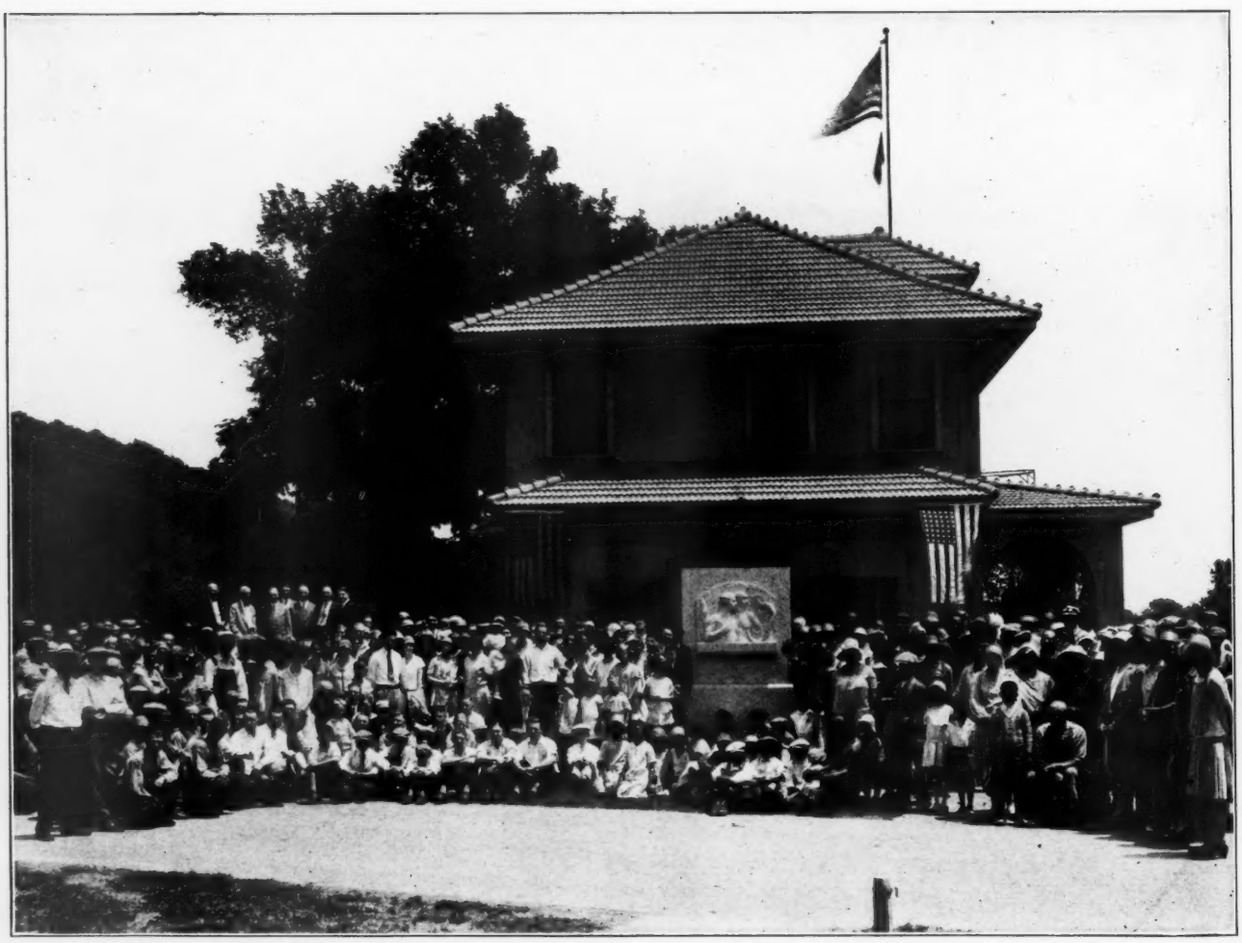
"This is indeed a splendid occasion. There is nothing that we can put our time and attention to that will go so far toward promoting happiness, and detract from the possibility of suffering as the work we are doing along safety lines. It is impossible to estimate how much suffering has been done away with as a result of safety activities. We are trying hard to do away with fatal accidents and disability and loss of time and income due to interrupted schedules because of accidents.

"This trophy has been won by but few mills throughout the United States. It is given to the mill that can succeed in working an entire year without a lost time accident. A few years ago it would have been thought impossible to operate a year, or month, without such an accident, yet we have 66 mills which have had no accidents during the first quarter of this year. Notwithstanding the large reduction in accidents, we are still having some that are needless, but I look forward to the time when accidents in industry will be a very rare occurrence. This mill is one of ten others which have been awarded trophies for operating throughout the year 1927 without an accident."

Mr. Curtis congratulated those present at the dedication of one of the trophies and formally presented the trophy to The Kansas Portland Cement Company. He pointed out that the man is cold and restricted of vision who is not thrilled at the achievement of a great industrial plant such as is here in Bonner Springs. He stated that the winning of the trophy required absolutely safe operation so far as lost time accidents are concerned. One mill failed by a bruise and another lost the coveted prize because of a scratch an inch long.

"Your representatives, Davenport and Ditte, received the formal award last week at the meeting of the Portland Cement Association in New York. It is my distinguished honor to be here to help you dedicate this handsome trophy which has been so proudly erected on this site. On behalf of the Portland Cement Industry of America, I now present this trophy to the Bonner Springs plant of the Kansas Portland Cement Company. May it speak loudly in the cause of safety, reminding all that the Bonner Springs cement plant has set a record which mills everywhere may strive to equal, but none can easily surpass."

In accepting the trophy, Mr. Wheeler said: "On behalf of The Kansas Portland Cement Company and all of our employees, I want to thank you, Mr. Curtis, and the Portland Cement Association, for this beautiful trophy. I want to say that I count it a great honor to be able to work here with these safe workers.



The Assembly Present at Award of Trophy

They are the best bunch in the country; if they were not we would not have been able to win this trophy.

"I thank the Association for having put up the trophy for us to work and strive for. It takes an incentive to get a group of men heartily behind a movement of this kind. Without the incentive, the chances are our safety work might be allowed to drag along. So we thank the Association for the incentive, also our officials in the New York office and in our Kansas City office, for the assistance they have given us in our safety work."

Mr. Wheeler then presented the Honorable U. S. Guyer, Representative in Congress from the Second District of Kansas, who congratulated the employees for the wonderful record made. He pointed out that two thousand years ago it was considered cheaper to throw men aside in case of injury or disability and leave them to die. Now great industrial plants are spending much time and money for the protection of their employees, which is one of the evidences of the world's progress. In further reference to the progressive age in which we are living, Mr. Guyer recited outstanding achievements in the various fields of aviation, radio, medicine, surgery and benevolence. "Some great preacher," said he, "has called John D. Rockefeller 'The Greatest Steward of the Almighty' because he is spending his millions to ameliorate the conditions of humanity."

Following Mr. Guyer's speech, Mr. Wheeler called on Mayor L. S. David, of Bonner Springs, who offered his congratulations to the company and to the workmen for winning the trophy, and expressed the pride of Bonner Springs in the cement plant.

The next speaker was C. L. Hogan, vice president from the New York office, who stated that both Mr. Struckmann and Mr. Bissell wanted to be present at this dedication and keenly regretted their inability to attend. He voiced their appreciation of the safety work which is being done at this plant.

J. A. Lehaney, vice president from the Kansas City office, said that while the other speakers were well justified in their complimentary remarks concerning the officials and mill forces in connection with the winning of this trophy, he felt that the women also deserve special recognition and expressed his thanks to them for their part in safety work.

William Moeller, general superintendent, was then called on. He communicated the congratulations of the Texas plants; expressed regret that the 1928 record has been marred with a lost time accident, but urged the employees of this mill that there must be no let up in their safety endeavors.

The next speaker was J. A. Wheeler, vice president of the Texas Portland Cement Company, at Dallas, and father of L. J. Wheeler, superintendent of the Bonner Springs plant, who said: "I come to you not only as representative of your sister company, but I might also say the mother company of the entire International System, for the Lone Star brand was originated by the Texas Portland Cement Company, at Dallas. I present to you her greetings and congratulations for your wonderful work during 1927, which has made this ceremony possible today. We tried our best to have the same kind of a ceremony in Texas, but right on the eve of the close of the year we lost out. We are trying again this year."

L. J. Wheeler concluded the program by calling attention to the space provided at the bottom of the trophy for placing silver plates to represent future years' no-accident operation, and invited the entire crowd to attend the celebration in 1930.

Large California Blast

The Pacific Portland Cement Company recently detonated a large blast at its gypsum quarry on Fish mountain near Plaster City, California.

According to Superintendent I. S. Elliott, 30,000 pounds of dynamite, in 84 four inch holes, 80 feet deep, along the 600 foot quarry face, were exploded at one time, loosening about 75,000 tons of gypsum rock. This rock will be taken from the quarry on a narrow gauge railway to the company's plant at Plaster City.

Alpha Moves New York Office

The Alpha Portland Cement Company has moved its New York City office from 16 East 43rd street to the New York Central Building, Park avenue and 46th street.

Northwestern Now Producing

The Northwestern Portland Cement Company has begun production in its recently completed plant at Grotto, Washington, with H. Elliott as superintendent.

New California Plant

A. C. McLellan has let a contract for the construction of a 400 foot spur track to a gravel bed situated between Felton and Olympia, California. Bunkers and other buildings will be erected soon.

Plan Kentucky Cement Plant

F. B. Drew, of McAllister, Oklahoma; Leigh Hunt, of New York City, and Robert Hunt, of Kansas City, recently signed a contract with the State of Kentucky whereby they agreed to erect a $1,750,000 cement plant in that state. The state in turn agreed to purchase 75 per cent of the cement produced during the next two years. A capacity of 4,000 barrels of cement daily is planned.

New Wyoming Cement Plant

The new $2,000,000 plant of the Monolith Portland Midwest Company in Laramie, Wyoming, will soon be in active production. This firm, although a separate corporation, is closely allied to the Monolith Portland Cement Company and will manufacture the same products.

Ohioan to Quarry Tufa Rock

Julian C. Miller of Castalia, Ohio, recently filed for record in Sandusky, leases entitling him to the exclusive right to quarry tufa rock on five large farms in the Castalia section.

Missouri Quarry Opened

C. F. Nagel, veteran government contractor of La Grange, Missouri, recently began work on the Oyster quarry just south of the city limits. The rock will be used for river and road work.

Pennsylvania Plant Damaged by Fire to Rebuild

The Sandusky Cement Company, whose stone crushing plant near West York, Pennsylvania, was recently damaged by fire to the extent of $15,000, plans to rebuild immediately. R. T. Landis, of York, is superintendent of the plant and C. W. Carlson is construction engineer for the company.

New York Firm Buys Two Plants

The Rock-Cut Stone Company of Syracuse, which operates a crushed stone plant at Jamesville and a sand and gravel plant at Belina, recently purchased the Watertown Stone Products Company, Incorporated, of Watertown, and the Lacona Sand and Gravel Company of Lacona, according to an announcement made by Stewart D. Ormsby, president of the Watertown and Lacona companies. Plans are to expand both of the new plants and to install new machinery.

Officers of the purchasing firm will assume general charge of the newly acquired properties. William L. Sporborg is president of the Rock-Cut Stone Company, Albert G. Seitz is secretary, and John F. Nash is treasurer.

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Michigan Plants Sold

L. A. Beeghly, representing interests which control the Bessemer Limestone and Cement Company of Youngstown, Ohio, and the Federal Portland Cement Corporation of Buffalo, New York, has acquired control of the Peerless-Egyptian Cement Corporation, which operates three plants in Michigan with an aggregate annual capacity of more than 3,000,000 barrels. Mr. Beeghly has been named chairman of the Peerless-Egyptian company.

New Utah Plant Operating

The new plant of the Brigham City Sand and Silica Company of Brigham, Utah, which began production recently, is now nearing capacity, which is about 600 tons per day. The plant was constructed at a cost of $6,000 and the property consists of 160 acres of sand hills.

Plans are being made to construct a track from the pit to the main track of the U. I. C. railroad.

New Corporations

Rock Asphalt Products Corp., Edward M. Hill, Grand Rapids, Mich. $500,000. A. J. Cumming, F. A. Valentine, Minneapolis, Minn.

Union Asphalt Co., Exchange Bldg., El Dorado, Ark. H. L. Williford, Sec.-Treas.; J. B. Sowell.

Franklin Sand & Cement Products Co., Ridgewood, Hainesburg P. O., N. J. $125,000.

Hollis Sand & Gravel Co., 600 Empire Bldg., Memphis, Tenn. $12,000. W. J. McDaniel, V. P. & Gen. Mgr.; J. S. Allen, W. D. Kyser, C. H. Carr, M. E. Krafft. Will operate two plants.

Webb City & Joplin Sand & Gravel Co., 722 W. Broadway, Webb City, Mo. J. G. Wilbur.

M. S. & B. Sand & Gravel Co., Wallington, Rutherford P. O., N. J. $100,000. Joseph B. Stadtmauer, Passaic; Clifton Bloom, Max O. Bloom, John Stock, Wallington; Jacob Miller, Rutherford, N. J.

Grant Sand & Gravel Co., Pollock, La. H. M. Price, J. A. Cook.

Alex Shapiro, Inc., Paterson, N. J. Sand and gravel. $100,000.

Victor Mica Co., First Nat. Bank Bldg., Hagerstown, Md. Raymond J. Funkhouser, Robert S. Beck.

Lawton Gas Sand Co., Lawton, Ky. $10,000. H. W. Hillman, R. H. Hillman, Harold Hillman.

Ruth Concrete Products Co., Vineland, N. J. $10,000. E. F. Miller.

Glen Allen Sand Co., Carbon Hill, Ala. $3,000. R. G. Wheeler, Cad Jones, Monroe Jones.

Panhandle Sand & Gravel Co., Lockney, Tex. $200,000; 100,000 shares n.p.v. Melvin A. Traylor, Chairman of Board, First National Bank, Chicago; A. B. Brown, Pres., Lockney; K. E. Keane, Sec., First National Bank, Chicago; Joe Kaberna, Treas., Lockney.

Mobile Gravel Organized

The Baker Gravel and Material Company was recently organized at Mobile, Alabama, with a capital of $25,000. J. G. Murphy is president; C. G. Baker, vice president and manager of production; and A. T. Baugh, secretary-treasurer and sales manager.

The new firm is separate from the Baker Sand and Gravel Company of Tuscaloosa, whose Mobile representative Mr. Baugh was for several years.

Atlas Cement Elects

The Atlas Portland Cement Company of Kansas recently held an election of officers in Kansas City. W. E. Miner, New York City, president; and Lowell Burch and D. H. McFarland, vice presidents, were reelected. Other officials chosen were: J. R. Moran, chairman of the board of directors; H. E. Harding, secretary-treasurer; and John P. Rucker, assistant secretary-treasurer.

Georgia Lime Company Leases Quarry

The Georgia Lime and Cement Company of Perry, Georgia, has leased a lime rock deposit near Abbeville, Georgia, from James L. Wilcox of McRae. A. C. Cobb will be in charge of the quarrying operations.

Thomas F. O'Brien Dies

Thomas F. O'Brien, president of the O'Brien Sand and Gravel Company, died at his home at 596 Second Street, Brooklyn, New York, on the 18th of June. He was 61 years of age.

Mr. O'Brien was also president of the O'Brien Brothers Corporation, the O'Brien Towing Company, the J. and T. Realty Company and the Independent Supply Company.

New York Firm Moves Plant

The Robinson and Eldridge Coal and Gravel Company is tearing down its plant at Fair Haven, New York. Plant and equipment are being moved to a sand and gravel bed on the River road near Fulton, which was recently purchased.

Dust Collecting Tests

The importance of adequate systems for collecting the dust which would otherwise be carried up the kiln and dryer stacks, has been very generally acknowledged. Recent tests made at the Northampton, Pennsylvania plant of the Lawrence, Portland Cement Company gave a striking illustration of the amount of waste which may be prevented. Before the installation of the present collecting system it could be easily seen by the dense clouds of dust which poured from the stack of the dryer house that a considerable amount of material was escaping into the air.

The gases from the stack vary in temperature from 200 degrees to 150 degrees Fahr., according to the moisture content of the crushed stone being dried. These stack gases are first drawn into a receiving bin which acts as a settling-chamber to trap the heavier portions of the dust. The bottom of this conical bin feeds the recovered dust into a screw-conveyor which removes it to the storage bins. From the top of this receiving bin two air-ducts convey the finer dust by suction to a set of 28 Norblo continuous air filters arranged in two double rows of seven each. For convenience in maintenance and inspection, walkways are installed at the top and between levels of the filter units, thus making each readily accessible at all times.

The fans, each handling fourteen units, are connected on the suction side of the filters. This avoids the wear and tear to which they would be exposed if compelled to operate in dusty air.

The results are stated to be satisfactory, approximately 60 tons of stone dust being recovered per day. The dust collecting system was built and installed by the same firm which had supplied similar Norblo equipment to the Lawrence Portland Cement plants at Thomaston, Maine.

New Mounting for Welders

A new mounting for Standard Lincoln Electric stable arc welders has been announced by the sales department of the Pontiac Tractor Company, Pontiac, Michigan. The welder unit, with stabilizer and panel, is mounted on a frame, which attaches to either a McCormick-Deering 10/20 or Fordson tractor. This mounting gives a four wheel rubber tired self-propelled unit which may be mounted on crawlers capable of hauling heavy loads. Power to drive the welder is taken from the tractor through the power takeoff pulley, which has a clutch, allowing it to be thrown out or into gear.

NEWS OF EQUIPMENT MANUFACTURERS

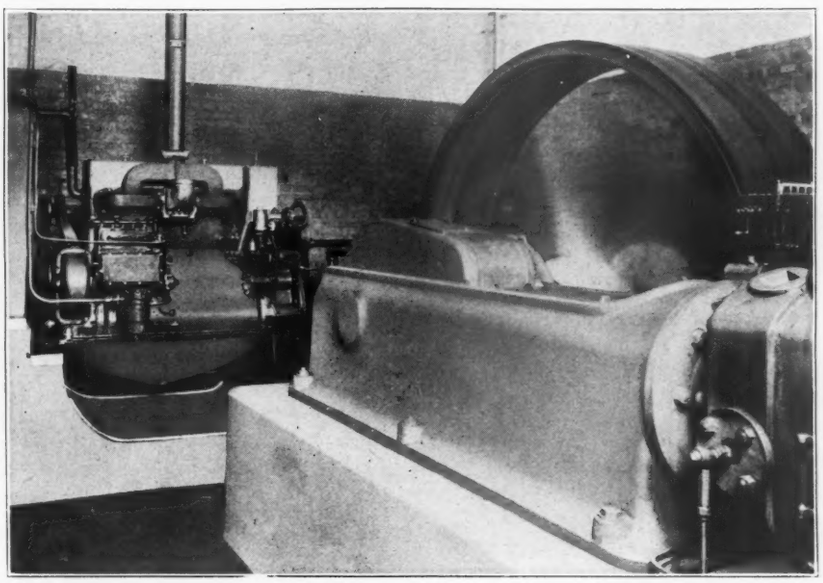
Diesel Engine Drives Air Compressor

The illustration shows a two-stage 16 by 10 by 14 inch air compressor of the horizontal type being driven by a four-cylinder Buda M.A.N. Diesel engine of 6 inch bore and 8 inch stroke operating at 950 r.p.m. A Twin Disc clutch is enclosed in a housing bolted directly to the flywheel, and the engine is connected to the compressor by means of a short belt and idler pulley.

The compressor delivers 400 cubic feet of air per minute against a pressure of 130 pounds per square inch, and the air is used to operate Harris air lift pumps in a deep well, raising the water from a depth of approximately 167 feet and delivering it to a storage tank.

Fuel with a gravity of 28 to 30 degrees Be. is used, which is supplied from the storage tanks through a Niagara meter to a tank mounted on the engine room wall. From the latter the fuel is fed to the injection pump on the engine by gravity, and a Zenith duplex filter is installed in the line to remove any foreign matter that may be in the fuel. Fuel is injected by a mechanical system, which is under control of the governor. The time of injection can be advanced or retarded, and the quantity of fuel regulated, so that the speed of the engine can be controlled manually as well as by the governor. The fuel is conducted from the injection pump through steel tubes to dividers mounted on the cylinder jacket, from which the fuel is delivered to spray nozzles on opposite sides of the combustion chamber of each cylinder. The nozzles are so arranged that the sprays pass to each side of the radial center line of the combustion chamber in such a manner that the fuel spray cones do not meet. Fuel consumption ranges from 0.40 to 0.45 pounds per brake horsepower, and smoke is absent from the exhaust.

Lubrication is accomplished by means of a positive gear driven pump with a pressure of 45 pounds per square inch maintained to all bearings, piston pins, and to the valve gear on each cylinder head. All moving parts are enclosed to promote cleanliness and lubricating oil economy, and a filter cleans all oil before it passes back into the engine. A lubricating oil reservoir fitted with gauge glass, settling tank and screen is mounted on the flywheel housing. The dry sump system is used to insure uniform lubrication under all conditions.



Diesel Engine Driving Air Compressor

A small air-cooled, two-cylinder, opposed type, gasoline engine, shown at the right of the illustration, is mounted on the flywheel housing and is used for starting duty. This engine is connected by a conventional type Bendix gear through a manually operated clutch and a short roller-chain drive.

Hill Clutch Machine Adds To Sales Organization

The Hill Clutch Machine and Foundry Company of Cleveland has recently made some important additions to its sales force. L. F. Dolan of Dorchester, Massachusetts, has that state; James T. Gordon Company of New York City will care for the state of New York; T. L. Rose and Sons will handle the Pittsburgh area; H. E. Woollam of Kalamazoo has Southern Michigan, and the McNeal Machinery Company, Joplin, Missouri, has been apportioned Kansas, Oklahoma and Missouri.

Heil Hydro Consolidation

Clement C. Smith, of the Heil Company, Milwaukee, Wisconsin, has announced a consolidation with the Hydro Hoist Company, a subsidiary. Mr. Smith is chairman of the board of the consolidated companies; J. P. Heil, vice president and treasurer of PIT and Quarry June 27 WICK the Heil Company, has been elected president and treasurer; Herman W. Falk, vice president, and W. N. Chester, secretary.

The Heil Company, which manufactures dump bodies, hoists and tanks of all classes, has a group of factory buildings on 18 acres of land in Milwaukee and recently completed a $250,000.00 building program which gave the factory a total of 214,000 square feet of floor space. Branch factories are operated in Boston, New York, Philadelphia, Cleveland, Detroit and Chicago, with distributors in all parts of the United States.

The Dunbar Drag Clam

The Dunbar and Sullivan Dredging Company of Buffalo, New York, in a 12 page illustrated booklet, describes the Dunbar drag clam, which is adaptable to the excavation of gravel pits, the stripping of overburden from quarries and mines, and for slack-line operations.

The bucket differs from the regular drag-line bucket in having a hinged jaw attached to the front of the bucket. When the bucket is filled the lift on the hoisting line closes this jaw, which is then held shut by its own weight. The load can then be dumped wholly or a part at a time.

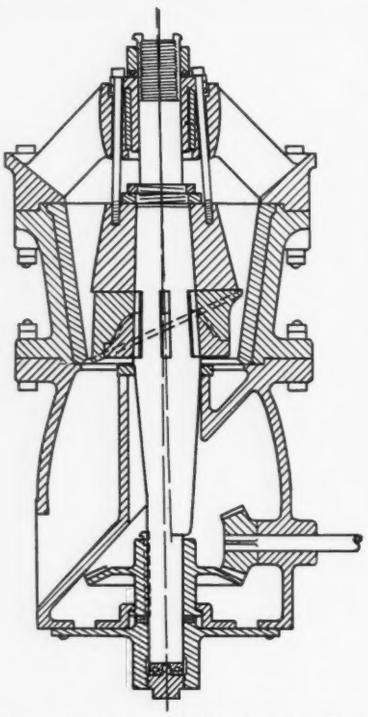
Buckets are made with capacities of ¾ to 4½ cubic yards. The frame is a one-piece high-carbon steel casting with a cutting edge slotted and grooved for removable manganese steel teeth. The movable jaw is also a steel casting which is doubled in thickness where the drag line is attached, and the shaft is cold rolled steel. All shackles and links are forged and the moving parts and bearings are accessible for lubrication and are easily renewable.

UNIVERSITY OF MICHIGAN LIBRARIES

A New Rock Crusher

A gyratory rock crusher embodying some new principles in design has been invented and patented by Alfred Molander of St. Paul, Minnesota.

This crusher differs from other gyratory crushers in that it has two crusher heads instead of the one ordinarily used; the upper head is loose on the shaft and gyrates only, while the lower head is keyed to the shaft and revolves only. The gyratory movement, as in all gyratories, is produced by an eccentric revolving shafting, while the lower head is keyed on the shaft off center enough to equalize the crank in the shafting, giving it a regular revolving movement. This odd eccentricity, it is claimed, gives the machine its smashing power.



Cross-Section of Molander Crusher

The lower, or sizing, head is angular in shape with right and left angles indicated in the illustration by dotted lines running from low point left to high point right on head, and is part cast iron and part steel. When the speed of the machine is right the left angle discharges, and when the speed is left the right angle discharges. Because of this, the inventor advises that every two weeks, or at least once a month, the speed should be changed from one direction to the other so that wear will be even. The cast iron lower part is keyed on the shafting, while the steel part fits over and into the cast iron in such a way that it is keyed to both the cast iron part and the shafting. It is claimed that the lower head can be removed and a new one installed in two hours' time.

The extra stock put into the lower head below the angle lines gives it weight and balance, the total weight of the head being about 500 pounds. Ample room, however, has been allowed all around for the rock to fall through.

This crusher is both first and second break, and, it is claimed, will crush large rock to one inch without oversize to come back and without stalling.

The inventor substantiates his claims by saying that a ten-ton first and second break crusher with an eight-inch opening was built and tested out privately, operating on hard limestone. A capacity of close to 60 tons per hour of one-inch was developed with a creation of only about one-third the usual amount of dust.

Oliver Machinery Absorbs Butterworth and Lowe

The Oliver Machinery Company of Grand Rapids, Michigan, has taken over the business of Butterworth and Lowe. This will include the manufacture of jaw and rotary crushers, marketing complete equipment for gypsum and the design of mills, together with manufacturing the necessary equipment. The Oliver Machinery Company has an engineering force, designing department, pattern shop, foundry and machine shops for the purpose of rendering a service to plaster mills, rock quarries and similar industries.

Lawrence Pumps Described

The Lawrence Pump and Engine Company, of Lawrence, Massachusetts, in its 8 page bulletin number D-28 describes the "Vortex" sand and dredging pumps, priming pumps, different types of centrifugal pumps and accessories such as flap valves, ejectors, connections, hose, elbows and pipe flanges.

The "Vortex" pumps have a semi-steel shell made in one casting, with a removable plate on each side, giving easy access to the inside of the pump or for the removal of the impeller, which is of the enclosed type. The stuffing box bearing is horizontally split, is easily removed from the shaft, and is provided with water injection to prevent sand entering the bearing.

These pumps are driven by electric motor, gasoline engine, steam engine, Diesel engine, belt, chain or gears; depending upon the power or fuel available and the conditions under which the pump is to operate.

A New Seaverns Steel Bin

The James B. Seaverns Company recently put into production a new type of all steel hopper bottom bin at the new plant at Batavia, Illinois.

This bin is known as the Type "B" batcher bin and is designed to come within railroad and highway shipping limits, the body frame being 10 feet wide by 14 feet long with removable legs.

The top of the bin is 10 feet wide by 19 feet long inside and is so arranged that various capacities can be obtained by adding sectional pressed steel plate side boards 12 inches high. Each sectional unit contains 7 cubic yards and the bins can be adjusted for capacities of 23 to 51 cubic yards in 7 yard variations.

The duplex strike off gate, which is of steel plate and channel construction, is mounted on frictionless roller races and is operated by a single hand chain. The drop bottom doors are also steel plate and are equipped with automatic latches and counterweights. The batchers are of galvanized steel plate, adjustable from 8½ to 17 cubic feet for sand and from 14 to 29 for stone, and can be equipped with automatic counters.

Thermal Relays Protect Industrial Motors

A new thermal overload device, which retains calibration and automatically permits the safe overload capacity of the motor to be fully utilized, has been developed by the Westinghouse Electric and Manufacturing Company. The thermal device follows the heating curve of the motor; which means the motor will not shut down instantly in case of high, but harmless, over-current demands. Excessive current may or may not mean a motor overload since heat in the motor winding does the damage and not the fact that the ammeter momentarily swings off scale. Motor temperature depends on the length of time the current flows, as well as on the amount of current. If either factor is small the other can safely increase and the machine will have the same temperature.

The thermal relay inherently reproduces characteristics similar to the motor heating curve and side steps the faults of an artificially delayed magnetic action. The heaters and bimetal work are of 150 degrees Centigrade, making the matter of ambient temperature a negligible error. The relay is easily adjusted for plus or minus 20 per cent of normal rating, by moving a small lever.

Kennedy Van Saun Issues New Catalog

The Kennedy Van Saun Manufacturing and Engineering Corporation of Danville, Pennsylvania, is distributing its 40-page illustrated Bulletin Number 14 describing equipment for mining and cement plants.

The Kennedy ball bearing gearless gyratory crusher is made in sizes weighing from 1,000 pounds (Number 1) to 1,000,000 pounds (Number 66). This crusher is equipped with a shaft without threads at the top of the head, which is self locking and all of the dead weight is carried on ball bearings.

The mammoth type roll hammer crusher has a steel plate frame, manganese steel housing, and ball and socket bearings supported on semi-steel pedestals. They are made in sizes from 36 by 36 to 54 by 72 inches.

The heavy duty rolls are made with a base of rolled steel H beams. Pressure is taken on heavy coiled springs connected by two steel tension bars. Sizes range from 24 by 10 to 84 by 30 inches.

The standard heavy-duty slugger rolls are made with special steel roll shells provided with knobs or "sluggers." Sizes are made from 36 by 36 to 60 by 72 inches.

Other products described are: Tower dryers, rotary dryers, indirect-direct rotary dryers, rotary kilns, air-swept tube mills, rotary coolers, ball, tube and combination mills, and rod mills. Two pages are also devoted to a synopsis of the cement industry and a flow sheet of a modern cement plant.

Combustion Promotes Cleary

James Cleary has been promoted to the position of general sales manager of the Combustion Engineering Corporation. He is said to be one of the best known men in this field, having engaged in engineering and sales work for over twenty-five years. Mr. Cleary's early experience was secured with Westinghouse Church Kerr Company as erecting and operating engineer in various parts of the United States and England. In the Spanish American War, Mr. Cleary served as chief machinist and warrant officer and during the World War was in charge of the steam equipment of the "Old Hickory" plant. He has been connected with various plants in the west and with the Public Service Gas and Electric Company of New Jersey. Since associating himself with Combustion Engineering Corporation, in 1921, he has been district manager of the Philadelphia and Detroit offices and for the past two years assistant general sales manager.

Sand Washers Described

The Dorr Company, Engineers, of New York City, in Bulletin Number 4171, describes the Dorrco sand washer. This washer consists of two main parts:—The washing and discharging mechanism; and the washing compartment in which this mechanism operates. This compartment is a flat-bottomed, circular container with an annular ring sloping about 4 inches per foot.

The mechanism consists of a central shaft and spider, to which a number of semi-circular scoops are attached, and is driven through a beveled gear and pinion. The rated capacity is 150 tons per hour and the power required to operate under heavy load is about 10 horsepower.

Naylor Pipe Expands

The Naylor Pipe Company of Chicago, until recently known as the Naylor Spiral Pipe Company, announces the completion of a new plant which increases its facilities about 200 per cent. The new product of this firm, Spiralweld Toncan iron pipe, being a standard weight pipe, necessitated both the expansion and the change in name. There will be no change in management.

Westinghouse Holds Annual Meeting

At the annual meeting of stockholders of the Westinghouse Electric and Manufacturing Company, held in the East Pittsburgh headquarters, the election of four directors to serve the term ending in 1932 and a modification of the by-laws were the chief items of business.

Of the four directors upon whom action was taken, three, whose terms expired, were reelected. These were Joseph W. Marsh, of the General Cable Company; H. H. Westinghouse, of the Westinghouse Airbrake Company; and Albert H. Wiggins, of the Chase National Bank. The new director, Charles A. Terry, a Westinghouse Electric vice-president, takes the directorship left vacant by the death of General Guy E. Tripp.

The stockholders ratified a change in the by-laws by which the fiscal year of the company now conforms with the calendar year. Instead of the fiscal year of the company ending March 31, as formerly, it will now end December 31. Due to the change in the fiscal year, the annual meeting of stockholders will be held, in the future, the second Wednesday in April, instead of the second Wednesday in June.

A Recent Development in Industrial Power

The New Way Motor Company is distributing bulletin 10, which consists of 8 illustrated pages devoted to the New Way twin air cooled engine number 2. This engine is claimed by the manufacturer to be the most powerful industrial machine of its weight ever made. It is air cooled for simplicity and economy; valves are in the head for power; and less moving parts for dependability and long life.

Among the special features of the 2 cylinder New Way Twin Number 2, which has a displacement of 56.54 cubic inches, are the special patented system of air cooling, en bloc cast iron alloy cylinders, and alloy steel valves in head, operated by enclosed push rods; cast iron pistons working in honed cylinder; crankshaft runs in oversize Bower roller bearings and camshaft on Hyatt flexible roller bearings; positive air governor with adjustable speed control from 400 to 1800 r.p.m.; only two gears; special Eiseman high tension flywheel magneto; Tillotson float feed automobile type carburetor and air cleaner; and positive plunger pump oil circulation to all working parts. The fuel may be gasoline, kerosene, gas or alcohol.

Switches for Starting Across the Line

The Electric Controller and Manufacturing Company, Cleveland, Ohio, is distributing an illustrated 4-page circular describing, in part, the E. C. & M. type ZO switches for starting a. c. motors up to 10 h. p. across the line. It advises that bulletin 1048, issued by the company, contains comprehensive information of value on the subject.

Lopulco Unit System

The Combustion Engineering Corporation of New York is distributing its 28-page catalog U-3 which describes the Lopulco Unit System for burning pulverized fuel. It covers the various types of horizontal, vertical and tangential burners. The application drawings which show the actual operations together with information on furnace design, are of considerable value to combustion engineers.

Allis-Chalmers Pulverators

The Allis-Chalmers Manufacturing Company of Milwaukee, Wisconsin, in its illustrated bulletin Number 1467, describes the Allis-Chalmers rotary hammer pulverators for pulverizing limestone and other dry non-abrasive materials.

The main shaft of this pulverator is made of heat-treated forged steel and the involute breaker plates and side liners are made of a special wear-resisting metal. The hammers and hammer arms are made of manganese steel, reversible and easily renewable.

The grates are made of tempered tool steel and are adjustable by spacers between the bars. They can also be renewed individually. The two bearings supporting the main shaft are the rigid chain or ring oiling type and have renewable babbitt shells.

Access to the interior can be had by loosening eight bolts and lifting the entire cover. Two clean-out doors are also provided, fitted with renewable liners. These pulverators are made in three sizes, either separately or in combination with a loader or a jaw crusher mounted on a steel truck.

New Bay City Distributors

Bay City Dredge Works, Bay City, Michigan, has appointed an additional number of distributors for the purpose of reaching those interested in Bay City tractor shovels, 16-B excavators and Model R full revolving shovels. The new agents include Roy Baker, of Houston; Lone Star Road Machinery Company of Dallas, and Tobin Machinery and Supply Company of San Antonio, Texas; Hooper Equipment Company, Indianapolis, Indiana; New England Implement Company, Boston, Massachusetts; McWhorter Tractor and Equipment Company, Chattanooga, Tennessee; Gale A. Goss, Durand, Wisconsin; Zimmerman, Wells, Brown Company, Portland, Oregon; Olympic Machinery Company of Spokane and Star Machinery Company of Seattle, Washington; and Midwest Equipment and Supply Company, Des Moines, Iowa.

R. H. Nichol Transferred To New York

R. H. Nichol, a senior representative of the du Pont Company, has recently been transferred to the New York City territory, according to an announcement from T. E. Doremus, manager of the office. Mr. Nichol will relieve Joseph Lang, who has represented du Pont for forty-three years, of such duties as Mr. Lang desires to relinquish.

Alamo Products Described

The Alamo Engine Company of Hillsdale, Michigan, is distributing five illustrated circulars describing the Alamo 2-cylinder engine, Alamo horizontal engines of 1½, 2 and 3-horsepower, of 4, 5, 7, 8 and 10-horsepower, deep well pumps for household service, and Alamo-Dorward rotary power heads. Complete specifications and details of all of these products are included as well as a number of illustrations showing them in actual use.

An Improved Tractor

The Monarch Tractors Corporation, Springfield, Illinois, a subsidiary of Allis-Chalmers Manufacturing Company, is distributing a 4-page illustrated booklet describing the Monarch 50 tractor. This model is a successor to the 6-ton tractor and retains all its power and operating abilities. Among the new features are tracks of pin drive type, all manganese steel with heavy rollers engaging the track drive sprockets; purolator which filters the oil supply; wider radiator and hood; drop forged steel truck wheels with shafts drilled for pressure lubrication, and pomona air cleaner.

New G. E. Data

The General Electric Company is distributing several illustrated loose leaf bulletins which are perforated for incorporation into the general catalog. Many of the bulletins are new and original, while others are intended to supersede portions of the catalog.

GEA-166A, "Crane and Hoist Motors," supersedes GEA-166. It describes MTC 3 phase and MQC 2 phase a. c. motors. These are made in from 15 to 175 h. p. Although these motors are intended for all classes of work in crane and hoist duty, they are successfully used on bascule lift and swing bridges, rotary car dumpers, lorry cars, coke pushers, hydraulic gates and yard locomotives.

GEA-403A, "CR3900, Drum type Switches," which were designed for the control of small a. c. or d. c. industrial motors, are described. These switches are especially adapted to throwing small a. c. or d. c. motors across the line. All CR3900 switches are enclosed in substantial cast iron or sheet steel cases, which exclude dust and dirt and prevent the operator from coming in contact with live parts.

GEA-753A, "CR9516, Shoe Type Solenoid Brakes," designed for a. c. and d. c. motors, are suitable for service on mills, cranes, hoists and similar applications. Both a. c. and d. c. brakes use the same frame and brake mechanism, and the solenoids are interchangeable.

GEA-832, "Portable Oil Testing Sets," supersedes bulletin 69717. These sets are compact, of light weight, simple to operate and were designed especially for field use. Current may be supplied from a standard lamp socket through a heavy reinforced attachment cord, with the plug, which is provided.

GEA-941, "Type C. P. Motor Driven, Center Gear Reciprocating Air Compressors," were designed for electric railway service. They are built with feet for floor or cradle mounting or with three point tee bolt suspension for direct mounting under the car.

GEA-953, "Type R Steam Turbines," are of the condensing and extraction types from 200 to 7500 k.w. capacities. These turbines were developed to meet the demands of central stations and industrial power plants. They are said to be of such design that they may be applied to any specific steam and load condition with high economy of operation.

GEA-957, "Mechanical Drive Turbines, Type D-53," are described as having attained a measure of success in driving centrifugal pumps, blowers and similar mechanical drives with practically any steam conditions. They are built condensing or non-condensing up to 600 h. p. and 6000 r. p. m.

GEA-972, "G-E Pot Electric Furnaces" were designed for cyanide hardening at temperatures up to 1650 degrees, Fahrenheit. Illustrations show construction and graphs give interesting data on the operation of these furnaces.

GEA-973, "CR3100 Drum Controllers," supersedes GEA-110. These controllers are for series, shunt or compound wound d. c. motors.

GEA-979, "CR2960-Sy104A and Sy103A Control Circuit Switches" are for either d. c. or a. c. motors with a maximum of 600 volts. The CR2960-Sy104A performs the functions of a momentary contact, start stop, push button station while the CR2960-Sy103A performs the functions of a single pole, double throw switch.

GEA-981, "Factory Built Complete Industrial and Small Plant Switchboards," are particularly adapted to substation or isolated plant service. They are 2500 volt, 3 phase, 3 wire and 25 or 60 cycles and provide for the control of motors, generators, transformers and feeders used for general power and lighting service where the total capacity to be handled does not exceed 3000 k.v.a.

Madsen Products Described

The Madsen Iron Works of Los Angeles, California, in an illustrated catalog, describes the Madsen portable paving plant with two tire dryer, cold and hot elevators, screens, grizzly, weigh box, bins, mixer, one-man control, electric power unit, shafting, and a number of asphalt paving tools.

The shell of the two tire dryer is made of 3/8 inch open hearth steel plate with the horizontal and circumferential seams electrically welded on the inside to prevent leakage. The first 18 inches of the shell at the feed end is arranged with a cone to distribute the feed and prevent it from spilling. Two 4 by 1¾ inch rolled steel tires are supported on twelve cast blocks and held in place by through rivets. The 2 7/16 inch main drive shaft extends the entire length of the dryer and has a universal joint at the lower discharge end. A 12 tooth, 2¼ inch, circumferential pitch, 6½ inch face, split cast iron pinion mounted on the power shaft operates the drum through an 84 tooth circumferential pitch, 6½ inch face, split cast iron ring gear. The seal ring is provided on the feed end and is of the floating ring and stationary ring type. The main frame is fabricated from structural steel with 8 inch main beams and is riveted together.

The cold elevator is built on two 6 inch channels and can be made any height by altering their length. The cold elevator chain is the web type and carries 7 by 12 inch buckets spaced one foot apart.

The hot elevator is somewhat similar to the cold but is enclosed by a sheet metal casing on the bottom half and galvanized iron on the upper half. These casings are made in 10 foot sections and are easily removable.

The grizzly at the head of the hot elevator is equipped with a bar grizzly with ¼ inch spacings. The screen has a diameter inside of 36 and outside of 46 inches; the two finer meshed screens are 47 inches long and the total screen length is 10 feet.

The bin under the screen has four compartments, is made of Number 10 iron and is 10 feet long, 9 feet wide and 8 feet high.

The one ton mixer has a body built in sections so that any part of it can be replaced. The two mixer shafts are 3½ inch square steel equipped with 32 steel shanks having adjustable hard iron tips and have cast iron 1½ inch pitch, 4½ inch face, gears keyed to the shaft.

New Koppel Air Dump Car

The Koppel Industrial Car and Equipment Company, of Koppel, Pennsylvania, a subsidiary of the Pressed Steel Car Company, recently completed an improved design, all steel, 100,000 pound, 30 cubic yard capacity automatic rolling trunnion air dump car, Class RTD-30.

The car weighs 66,000 pounds and has a length inside of body at top of 34 feet and width of 9 feet 3 inches. The length inside at bottom is 32 feet 4 inches and the width 8 feet 10½ inches; and the depth inside of body is 2 feet 8½ inches. The length over striking plates is 38 feet 4 inches, the overall width 10 feet 3⅞ inches, and the height 7 feet 9 5/16 inches. The dumping angle of the body is 45 degrees, the wheels are 33 inches ARA chilled iron, the axles 5½ inch and 10 inch ARA and the gauge is 4 feet 8½ inches.

A feature of the design is that the entire weight of the car body and lading is carried in stable equilibrium directly on the center sills without the use of trunnions. This is accomplished by rolling diaphragms built into the bolster constructions located centrally on truck centers and by four rolling diaphragms, one located at each cross bearer supporting the air cylinders.

The direct bearing surface between the body and underframe members extends 25 inches on either side of the center of the car, and when air is applied in the lifting cylinders the car body rolls from a point 25 inches from the center until the upper stops at the end of the bolsters and diaphragms engage the lower turning seats attached to the underframe.

Another feature is an interlocking cast steel stop device just back of each underframe bolster to prevent transverse and longitudinal movement of the body due to rough handling, preventing damage to the piston rods and other parts.

The dumping of the car is controlled by three valves:

The indicator valve, which indicates the side on which the car is to be dumped, is manually set by a rod passing across the car at the ends of which are index plates. This valve can be set to dump on either side or neutral.

The operating valve is located at one end of the car, and when opened admits air to the set of cylinders on the side for which the indicator valve is set, dumping the car. The operating valve handle can be locked in a closed position when necessary.

The control valve allows the cars to be operated in trains from the operating valve of any car selected in the train, and by proper setting of the indicator valve any car or cars in the train can be controlled as desired.

United States Gypsum Moves Mid-Eastern Office

The United States Gypsum Company has transferred its mid-eastern district office from Chicago to Philadelphia. The new office is located in the warehouse which was recently completed on the site of the plant being built at 58th Street and the Schuylkill River.

R. S. Slattery, district sales manager, will be in charge, and will supply this district with gypsum products from the plant being erected here and the one in operation at Plasterco, Virginia.

The New Koppel Car

United States Gypsum Buys Two Plants

The United States Gypsum Company has plans under way to completely modernize the gypsum mills recently purchased from the Northwest Products Company, at Heath, Montana, and the Overland Plaster Company, at Laramie, Wyoming. Mill equipment will be revised for the manufacture of gypsum plaster and the sites will be improved.

McIntosh Seymour Discuss Diesel Powered Dredges

The McIntosh and Seymour Corporation of Auburn, New York, in a 20 page illustrated booklet describes installations of Diesel engines of their manufacture in different types of dredges.

A comprehensive discussion of the comparative values of Diesel or Diesel-electric and steam or outside electric power, as well as a table showing their comparative efficiencies, is included.

Installations in dredges ranging in size up to the largest in existence are described and illustrated with photographs and detailed drawings. Complete specifications of several installations are given as well as tables of operating and maintenance costs.

Oregon Cement Expands

The Oregon Portland Cement Company plans to install a new cement grinding mill and two packing machines as well as other equipment in its plant at Lima, Oregon. The present capacity is 1,200 barrels of cement a day and this will be doubled.

A New Jaw Crusher With Roller Bearings

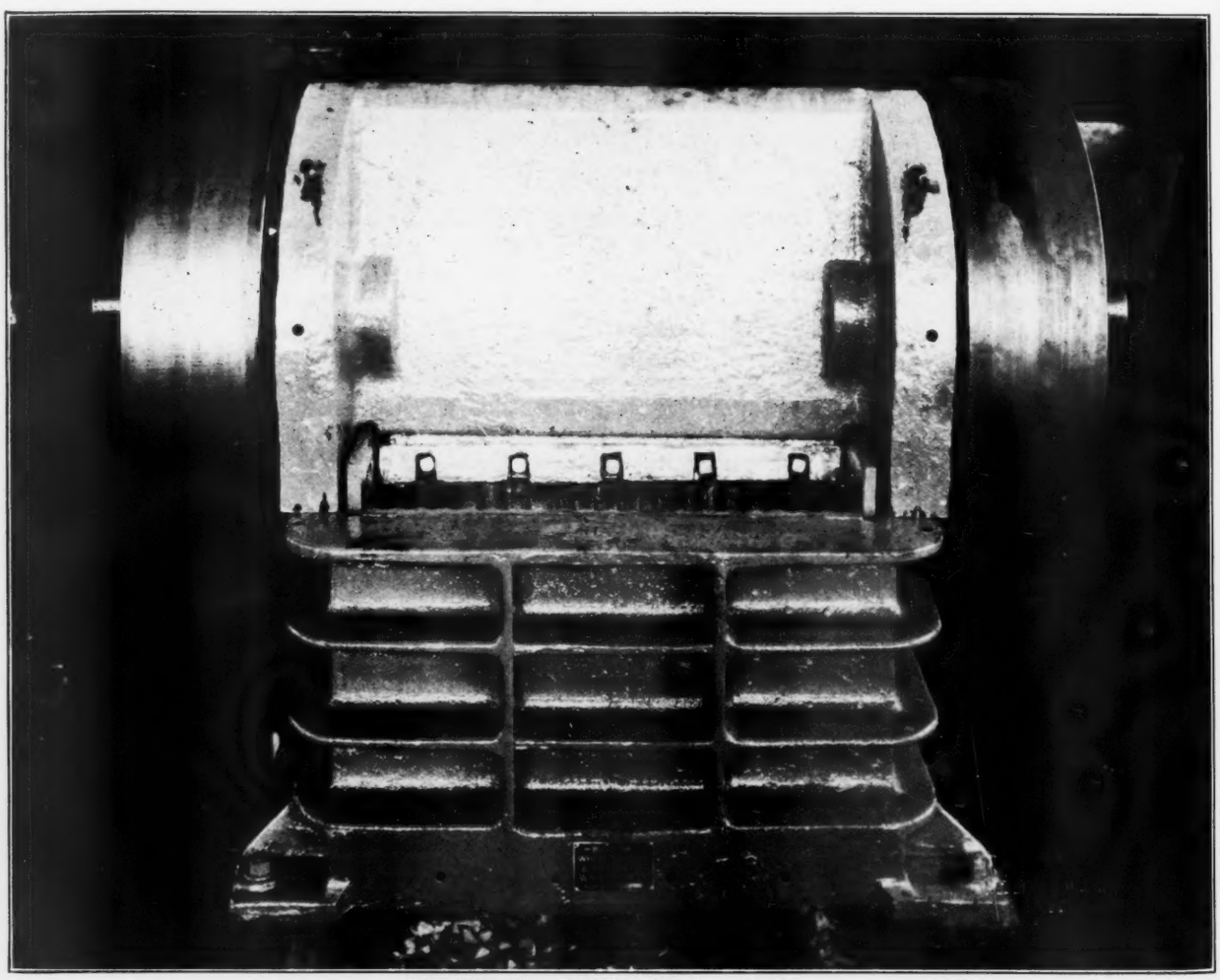
The Wheeling Mold and Foundry Company of Wheeling, W. Va., who have been manufacturing Jaw Crushers for over 15 years, announce a new roller bearing jaw crusher, after months of experimental work and shop tests.

Both pitman and main frame bearings are equipped with roller bearings, needing no adjustment.

Factory tests on hard granite and slag through a 9 by 36-inch crusher, weighing 19,270 lbs., with hopper fully loaded, indicated less than 10 hp. actual ammeter readings. It was possible, claim the manufacturers, to turn the crusher freely by hand, and several large granite boulders were thrown in and actually crushed by turning the flywheel by hand.

The crusher is practically free from vibration, and the absence of vibration was demonstrated by placing a level glass of water on the frame of the crusher while crushing hard rock without spilling of water. This means economy in foundation design and saving of wear and tear on appurtenant machinery and structures. Chunks of steel were dropped in and hammered out until flat enough to pass through without any indication of strain or breakage on the crusher.

The frame is a solid one-piece cast steel structure as in the past. All jaws manganese steel. Shaft is nickel alloy steel. Bearing construction is fool-proof and dust-proof. All parts are interchangeable. Regular equipment includes cast steel guard, wrenches and oil gun. These crushers will be manufactured in four standard stock sizes, together with their regular line of bronze bearing crushers.



New Wheeling Ball Bearing Jaw Crusher